AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

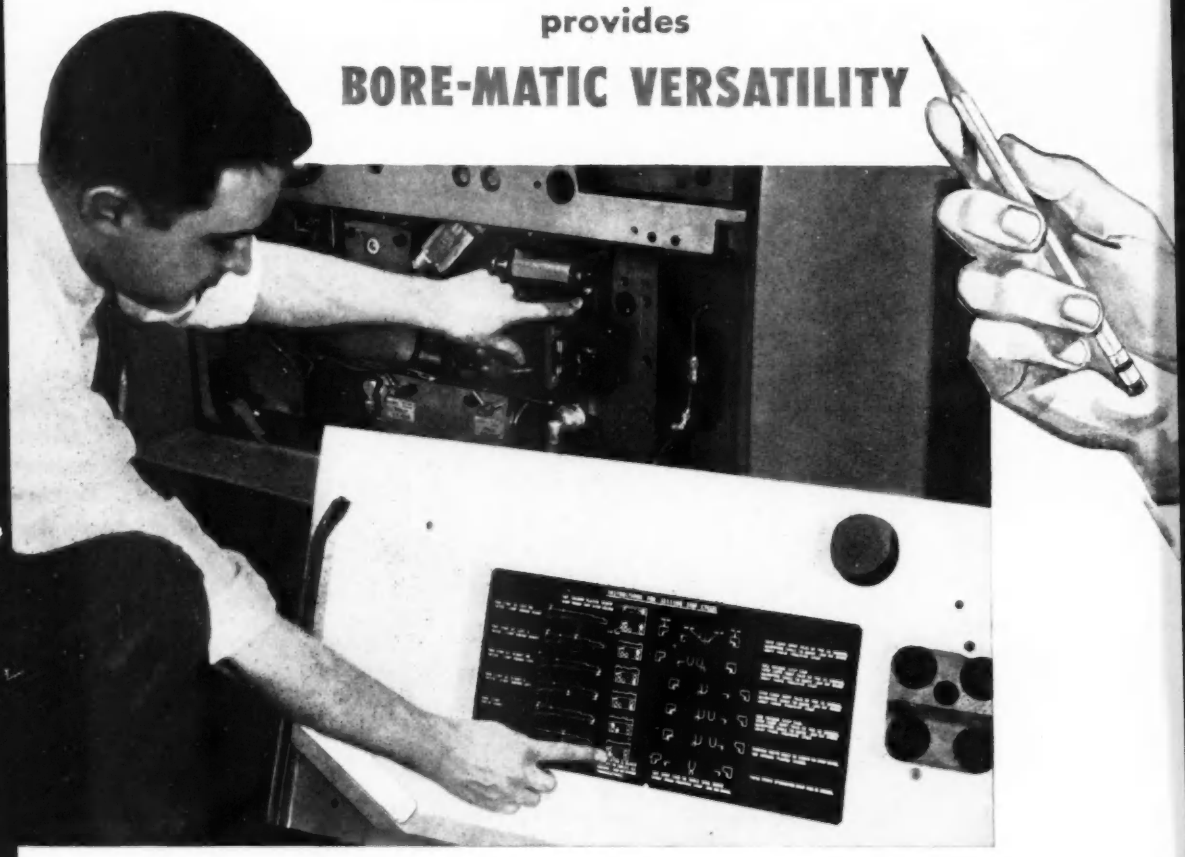
In This Issue . . . Army Equipment in Alaska · · · Special Machines for Making Small Parts · · · Willys Body Design · · · New Tooling at Chrysler Tank Plant · · · Sealing the Thunderjet · · · 10,145 Jet Engines

APRIL 15, 1952

Complete Table of Contents, Page 3

A CHILTON PUBLICATION

Here's How Heald provides BORE-MATIC VERSATILITY



The Automatic Cycles on your Heald Bore-Matic can easily be changed without additional equipment

Webster defines the word *versatile* as follows: "Turning with ease from one thing to another; having aptitude for new tasks." That's exactly what is meant by the versatility of a Heald Bore-Matic. Although normally supplied for a specific job, each machine is designed to permit the use of several basic machine cycles. Conversion from one cycle to another is simply a matter of turning a knob, changing the position of a screw, and readjusting the table cams and dogs. Instructions for making these changes are included on the inside of the control panel cover as shown above.

If you have a changeover problem, just call your Heald representative. His most important job right now is helping you *get the most* out of your Heald equipment.

HEALD

Heald machines speed the nation's production

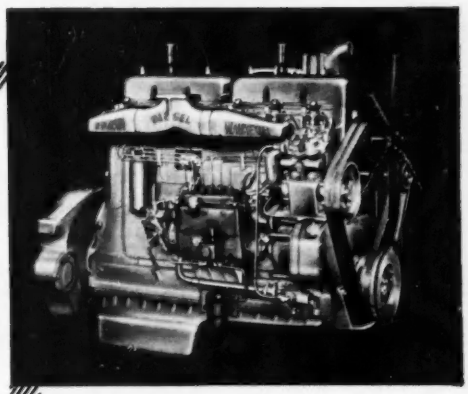
THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

WAUKESHA *Diesel*

for heavy hauls and steep grades



148-DK High Duty DIESEL — six cylinder, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement, peak hp 200.

● No matter how heavy the hauling or how stiff or steep the grades—where the pay-off is on pulling payload—you make the miles with this Waukesha High-Duty Diesel.

It is designed to keep on putting out the power. And, with all its exclusive Diesel design advantages, its advanced construction and material features—it can do it.

The 7-bearing hardened crankshaft is counterbalanced; has a torsional vibration dampner. There's long life in the triple element, steel-backed, copper-lead-babbitt heavy-duty, precision bearings. Wet cylinder sleeves and overhead valves are easily serviced. Heavy-duty, aluminum alloy pistons are cooled by positive oil delivery to the chamber beneath the piston crown. "Keystone" compression rings, top ring chrome plated, are non-sticking. Valves are Stellite-faced, with Stellite inserts for intake and exhaust seats. Dual valve springs. Valve guides are removable. Oil pump is outside mounted; oil cooler built-in.

Among the many outstanding Diesel design features, the patented spherical combustion chamber is most important. With its clean burning, lively acceleration, smooth shock-free operation, high fuel economy with low maintenance—it puts the pay in payload power. Send for Bulletin 1532. 171

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES

Introducing

A NEW MEMBER OF THE INCO FAMILY INCOLOY

Incoloy is a wrought nickel-chromium-iron alloy, developed as a nickel-saving companion to Inconel. It is a high temperature material with good resistance to oxidation, strength at elevated temperatures and workability comparable to that of Inconel.

The principal engineering characteristics of Incoloy are:

- **Oxidation Resistance** – the oxidation resistance of Incoloy is of the same order as Inconel. It has a chromium content of 21%.
- **Physical Constants** – Physical constants are similar to type 330 stainless steel.

INCOLOY
Mechanical Property Ranges of Standard Forms at Room Temperature

Form & Condition	Tensile Properties: Tensile Strength 1000 psi	Yield Strength (0.2% Offset) 1000 psi	Elongation in 2 in. per cent	Hardness: Brinell 3000 kg.	Hardness: Rockwell
Rod and Bar					
Cold-drawn					
Annealed	75-100	30-55	50-30	120-170	66-86B
As-drawn	100-150	80-125	30-10	180-290	90B-30C
Hot-Rolled					
Annealed	75-100	30-55	50-30	120-170	66-86B
As-rolled	80-120	35-90	50-25	135-220	74-96B
Forged	80-120	35-90	50-25	135-220	74-96B
Wire					
Cold-drawn					
Annealed	75-105	25-55	50-25	.....	.....
Plate					
Hot-rolled					
Annealed	75-105	30-55	50-30	120-180	.....
As-rolled	80-120	35-90	50-25	135-220	.....
Sheet					
Cold-rolled					
Annealed	75-100	30-55	50-30	.....	88B (max.)
Deep drawing and spinning quality	75-100	30-45	55-35	.....	80B (max.)
Strip					
Cold-rolled					
Annealed	75-100	30-50	50-30	.....	84B (max.)
Deep drawing and spinning quality	75-100	30-45	55-35	.....	80B (max.)
Tubing					
Cold-drawn					
Annealed	75-100	30-55	50-30	.....	88B (max.)

- **Expansion co-efficients**—The expansion co-efficients are approximately those for Inconel. Thus Incoloy should have about the same high temperature resistance to cracking under drastic temperature changes. Because of its relatively high nickel content (32%) the structure of Incoloy is stably austenitic showing no tendency to become embrittled by precipitation of sigma or carbidic phases after prolonged exposure to intermediate temperatures.
- **Room temperature properties** – Room temperature mechanical property ranges of Incoloy mill forms are shown in the table on the left:
- **High Temperature Properties** – High temperature strength properties of Incoloy are comparable to those of Inconel.

In terms of behavior in various high temperature environments it is anticipated that Incoloy will be superior to Inconel in resistance to sulfidation, green-rot and molten cyanide salts. Incoloy is comparable to Inconel in resistance to oxidation.

- **Work Hardening**—The rates of work hardening of Incoloy and Inconel are practically identical.
- **Annealing** – Annealing temperatures for Incoloy should be within the range of 1800° F. to 2000° F.
- **Fabrication**—Incoloy is workable, both hot and cold. It is machinable, though high-speed steel tools should be used.
- **Welding** – For metal arc welding, "132" Inconel electrode is recommended for all gauges. For inert gas metal arc, "62" Inconel filler wire is recommended. Sheet or strip up to ¼" may be joined by this method.

Forms supplied – Incoloy is produced in the usual mill forms – billets, rounds, flats, hexagons, sheet and strip, tubing and wire.

For additional information on Incoloy write to our Mr. R. F. Johnson.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

EMBLEM OF SERVICE
NICKEL INCO ALLOYS

MONEL® • "R"® MONEL • "K"® MONEL • "KR"® MONEL
"S"® MONEL • NICKEL • LOW CARBON NICKEL • DURANICKEL®
INCONEL® • INCONEL "X"® • INCOLOY® • NIMONICS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

April 15, 1952 Vol. 106, No. 8

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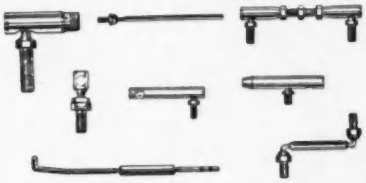
TOUREK

BALL JOINTS • PIPE PLUGS AND QUALITY SCREW MACHINE PRODUCTS



ball joints—By specifying Tourek Ball Joints — the only recognized standard — you can frequently simplify design, improve performance and lower costs. A wide range of standard types is available to meet most requirements. Ball Joints for special applications can be designed and produced to your specifications.

pipe plugs—Tourek's countersunk Pipe Plugs are accurate, high strength and economical. These advantages are yours at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: ¼", ⅜", ½", ¾", and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 1½" diameter.

screw machine products—Tourek sets the pace for quality and service for your screw machine product requirements. A vast array of high speed precision equipment, including single and multiple-spindle automatics as well as complete secondary equipment, is backed by more than 30 years' production experience. You can depend on Tourek for "The Best In Quality Screw Machine Products."

LITERATURE

● Comprehensive data on any or all Tourek products sent promptly upon request . . . write for yours now. J. J. TOUREK MFG. CO., 4701 W. 16th St., Chicago 50, Illinois.

ESTABLISHED 1920

Our New Plant To Be Occupied In July

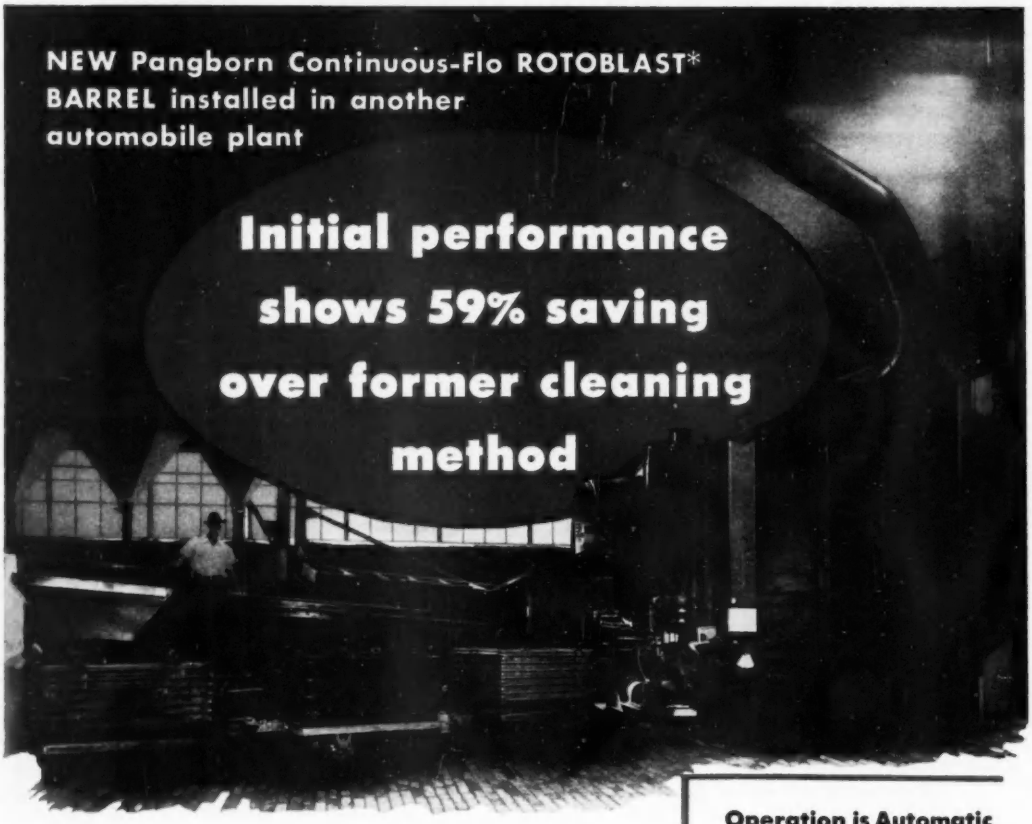
TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"

AUTOMOTIVE INDUSTRIES, Vol. 106, No. 8. Published semi-monthly by Chilton Co., Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, 1 year $2.00, 2 years $3.00. Canadian and Foreign $5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), $1.00.

NEW Pangborn Continuous-Flo ROTOBLAST* BARREL installed in another automobile plant

Initial performance shows 59% saving over former cleaning method



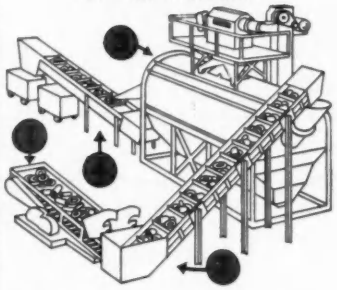
EARLY reports from one of America's foremost automobile makers show its new Pangborn *Continuous-Flo* ROTO-BLAST Barrel increases production and reduces costs. Forgings are cleaned at a *59% saving* over pickling . . . including all costs for materials, maintenance, power and labor!

Labor costs are down because manual handling is eliminated. Cleaning has been stepped up to an average rate of 12 tons per hour . . . 17 tons an hour on some forgings. And a public relations problem has been solved because pickling acid no longer pollutes nearby streams.

GET THE FACTS ON PANGBORN ROTOBLAST. Whether you pickle or clean with multiple batch equipment or tumbling mills . . . Pangborn has a ROTOBLAST Machine to clean faster, better and cheaper. Bulletin 214 gives full details. For your free copy write: Pangborn Corp., 3900 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Operation is Automatic and Continuous



1. *Forgings are dumped from tubs onto an independent loading conveyor.*
2. *An integral flight conveyor feeds forgings to Barrel at an even rate.*
3. *Work moves continuously through Barrel while being cleaned by two ROTO-BLAST streams.*
4. *Forgings are discharged from Barrel to tubs by automatic conveyor. No manual handling is necessary.*

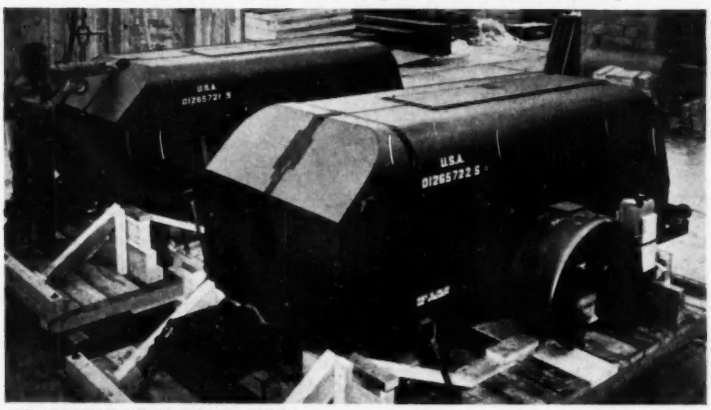
*TRADEMARK OF PANGBORN CORPORATION

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

GOV'T SPEC
specialist relies on Polyken

TAPING SHUT the ignition key slot on the Army's mobile shower unit. Worker uses Polyken Tape No. 214. You can see where he's already sealed a packaged fire extinguisher (upper left), a valve outlet (upper right), as well as the instrument panel which he is just completing.



COMPLYING WITH GOV'T SPECS, these army mobile shower trailer units are sealed with Polyken No. 214, ready for overseas shipment.

How to meet Government Specification JAN-P-127- Amend 3 safely, economically

Packaging and crating for Gov't Spec and export is the business of August G. Barkow Co., Milwaukee. They rely on Polyken Industrial Tapes—made by the company that makes 30 tapes meeting Government Specification JAN-P-127-Amend 3.

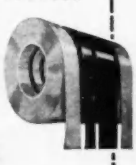
For example, on U. S. Army mobile shower units, manufactured by Cleaver-Brooks Co., Barkow uses Polyken No. 214 to seal all openings—seams, pipes, hoses, and tool kits—against dirt, dust, moisture and rust.

Polyken No. 214, used here, is black. Also available in nine other colors—all conforming to the same Government Specification—all equally fast, sure, economical.

These 30 tapes represent only a small part of our full line of "tapes that do things you never thought tape could do." Send in coupon for free samples and booklet.

TAILORED TO YOUR JOB

Polyken®



INDUSTRIAL TAPES

Department of Bauer & Black
Division of The Kendall Company

Polyken, Dept. AID
222 West Adams St., Chicago 6, Illinois

For specifications, samples, and further information on No. 214 and other Polyken tapes, please send me your *FREE BOOKLET*, "Tape is a Tool."

Name_____ **Title**_____

Company_____

Street Address_____

City_____ **Zone**____ **State**_____

PRESS BREAKDOWNS ENDED BY SUNTAC

A large ball-bearing manufacturer was having trouble with the oil used in some older heavy-duty presses. At frequent intervals the machinery had to be shut down due to bearings overheating. Because the oil would not *stay in*, bearing life averaged only eight months. Each failure took a press off the line for a month or more. Floors had to be cleaned constantly to keep them from becoming slippery and hazardous. Many different oils were tried in an effort to remedy the situation, but none proved adequate for the job, and production suffered.

Finally the company called in a Sun representative for consultation and changed to a Suntac Oil at his suggestion. Results were excellent, and the presses have operated without a bearing failure ever since. The adhesiveness of Suntac prevents it from squeezing out and keeps the bearings running cool. For the same reason the floors around the presses are free from oil-drip. Oil consumption has been cut 50 percent.

If you are having trouble keeping old or worn equipment *on the job*, use the coupon below.

NO MORE MANUFACTURING DELAYS. The manufacturer of these bearings uses heavy-duty presses to blank out parts. The problem of press bearing failures due to inadequate oils has been eliminated by changing to Suntac.

SUN OIL COMPANY, Dept. AA-4 Philadelphia 3, Pa.

We are having bearing failures possibly caused by faulty lubrication.

- ☐ Please have a Sun representative call.
- ☐ Send me your booklet "Suntac Oils Case Histories."
- ☐ Send me your technical bulletin "Lubrication of Industrial Machinery."

Name_____

Title_____

Company_____

Street_____

City_____ Zone_____ State_____

TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on lubrication matters. It will pay you to utilize the broad experience they have gained in solving a wide variety of problems in many different industries.

CLEAN FLOOR, CLEAN MACHINE. Adhesiveness prevents Suntac Oil from squeezing out of the bearings. Before Suntac was used, floors had to be cleaned constantly to keep them from becoming slippery and dangerous.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

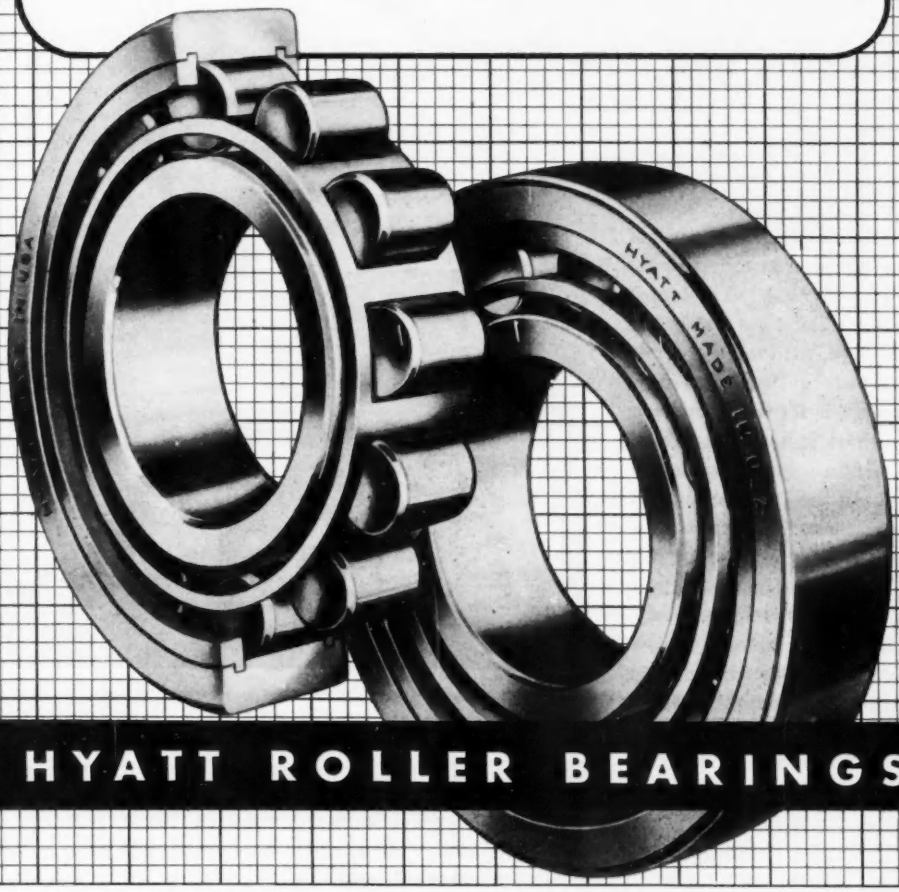
SUNOCO®

For '52 · · · HYATTS As Usual

A review of the car, truck, and bus models for 1952 shows Hyatt Roller Bearings, as usual, predominating.

Automotive design engineers call for Hyatt applications in differentials . . . rear wheels . . . pinions . . . transmissions . . . steering gear and other positions. Hyatt makes various types and sizes of roller bearings to meet the requirements of the industry.

Over the years, Hyatts have proved their precision, quality and long-life—important factors appreciated by leading manufacturers. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.



HYATT ROLLER BEARINGS

New United Air Cleaner Built Around Carburetor

SPECIAL DEVELOPMENT FOR 1952 LINCOLN

Notice how this new United Air Cleaner is designed to mushroom around the entire upper body of the carburetor. United builds over 200 different air cleaner models — a size and type for every kind of internal combustion engine.

This new United Oil Bath Air Cleaner is built entirely around the carburetor instead of fastening on top as in conventional designs. It is especially adapted to an overhead valve V-8 engine. Here, with the large area needed by the engine plus additional space for the carburetor, there is not enough head room to fit a regular air cleaner within the low hood height specifications. The new United cleaner, by enveloping the carburetor, meets these requirements nicely.

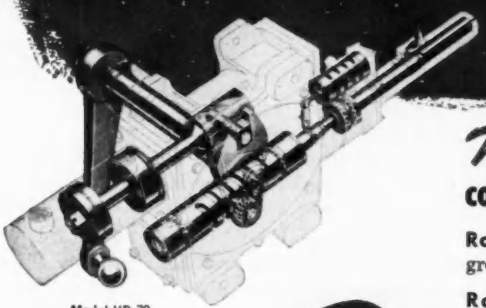
Here is another example of how United engineers, working closely with manufacturers, develop special designs to meet special conditions. We invite your inquiry.

Lincoln 1952 Capri special custom coupe. It is powered by a 160 hp. V-8 engine.

UNITED SPECIALTIES Company

United Air Cleaner Division — Chicago 28, Illinois
Mitchell Division — Philadelphia 36, Pennsylvania
Birmingham 11, Alabama

Ross HYDRAULIC POWER STEERING . . . SINCE 1942



Model HP-70
Effortless,
Fatigueless
Steering

Now . . . EASIER, SAFER STEERING FOR COMMERCIAL VEHICLES AND PASSENGER CARS

Ross Hydrapower instantly prevents loss of control in soft ground, sand, snow, from tire blow-outs or road obstructions.

Ross Hydrapower steered wheels promptly return to straight-ahead driving position after turns.

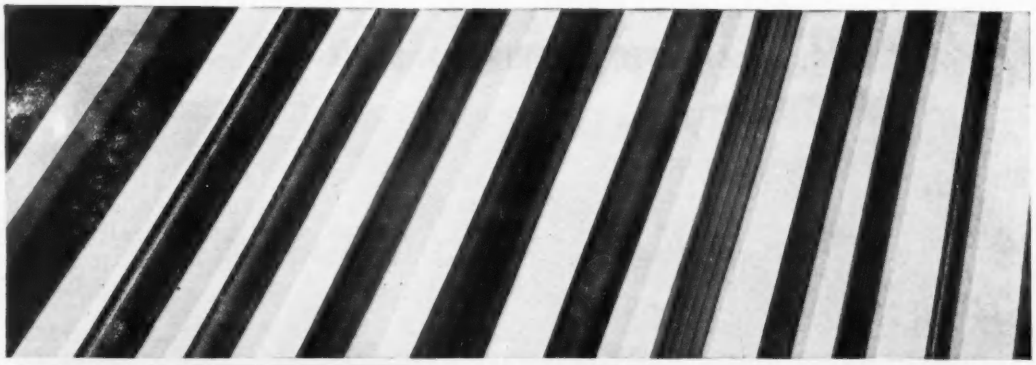
With Ross Hydrapower there is no lag in the hydraulic response either for power assistance or resisting shocks—consequently no tendency to over control.

Ross pioneering in assisted steering dates back to 1942 when the U. S. Army chose *Ross* to solve its then toughest steering problem—the 50-ton tank retriever.

While most current *Ross Hydrapower* production is devoted to military needs—as government requirements permit, *Ross Hydrapower* will bring new steering *ease, safety* and *satisfaction* to additional commercial vehicles and passenger cars.

HYDRAPOWER Ross Cam & Lever STEERING

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA



Unsurpassed *Synthetic* RUBBER COMPONENT PARTS

Users of Acadia Synthetic Rubber component parts in hundreds of industries have found them unsurpassed. No matter what function synthetic rubber must perform, depend on Acadia parts. They best meet exacting specifications and operating conditions such as moisture, oil, heat, wear and age resistance. Molded, extruded, die-cut to close limits—compounded to meet specific conditions. Acadia engineers will gladly cooperate.

- Seals
- Gaskets
- Washers
- Cups
- Channel
- Strip
- "O" Rings
- Sheet
- Tubing
- Roll Goods
- Cut Parts
- Lathe Cut Washers

Sheet and Roll Felt Manufactured for Special Purposes and To Meet All S.A.E. and Military Specifications.

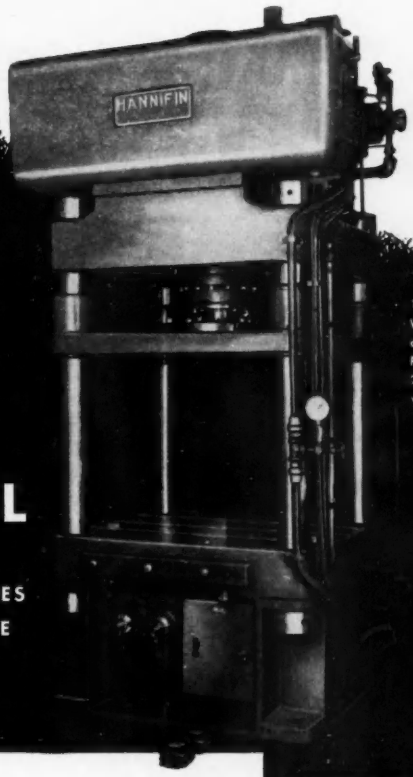
ACADIA *Synthetic* **PRODUCTS**

Processors of Synthetic Rubber and Plastics • Sheets Extrusions • Molded Parts

DIVISION WESTERN FELT WORKS
4035-4117 OGDEN AVENUE • CHICAGO 23, ILLINOIS

IT'S ALL A MATTER OF CONTROL

HANNIFIN HYDRAULIC PRESSES CAN BE EQUIPPED WITH THE *CONTROLS YOU NEED*



150-TON FOUR-COLUMN PRESS—Semi-automatic cycle. Advance at high speed, feed stroke starting at pre-set point in stroke and automatic reversal. Self-contained unit with reservoir, hydraulic pumps and control valves on top of press. Dual electric push buttons.

15-TON FORCING PRESS—With built-in hydraulic power unit and exclusive, patented Sensitive Pressure Control. Gap, 22"; stroke, 21"; reach, 10"; table, 19" x 22" with U slot.

HANNIFIN'S NEW HYDRAULIC "HAN-D-PRESS"—For small part assembly operations. Available in 1-ton and 2-ton sizes with pressure adjustable. Stroke, 6"; reach, 6"; gap, 10". Speeds: (1 ton) 400 ipm, advance; 800 ipm, return. Dual manual controls standard.

35-TON OPEN GAP STRAIGHTENING PRESS—One of 17 standard straightening presses. For straightening crankshafts, axle shafts, line shafts and cylinder stock. Equipped with exclusive Sensitive Pressure Control and spring-mounted, work-holding fixture on 160" rails.

When you select a hydraulic press to do a certain job—*it's the control that's all-important.* Here Hannifin excels . . . for Hannifin Hydraulic Presses are supplied with many types of control.

One outstanding Hannifin development is patented Sensitive Pressure Control . . . standard equipment on Hannifin straightening and forcing presses. But Hannifin also offers conventional manual control, adjustable for maximum pressure, and a wide range of electric push button controls. Rapid advance followed by slow feed stroke, automatic reversal on time, pre-set pressure, or distance, all are available when needed. Ram speed control can be supplied as an optional extra feature with any of these controls, and cycling can be automatic or semi-automatic.

Chances are you can select the right press, and the type of control you need, directly from Hannifin's catalog . . . it lists more than 75 models, capacities from 1 ton to 150 tons. However, if your requirements are special, a Hannifin Field Engineer will analyze them, then recommend the exact control, or combination of controls, to do the job. Why not consult with him? Hannifin Corporation, 1143 S. Kilbourn Ave., Chicago 24, Ill.

Hannifin Representatives Are at Your Service In These Leading Industrial Centers

Atlanta, Chicago Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Houston, Los Angeles; Milwaukee, Minneapolis, Moline, New Orleans, New York, Philadelphia, Pittsburgh, Richmond, Va.; Rochester, N. Y.; St. Louis, San Francisco, Seattle; South Bend, Ind.; Washington, D. C.; or Worcester, Mass. In Canada, F. F. Barber Machinery Co., Toronto, Montreal, Windsor, Hamilton, Vancouver.

HANNIFIN

Hydraulic Presses • Pneumatic Presses • Hydraulic Riveters
Hydraulic Cylinders • Air Cylinders • Air Control Valves

WRITE FOR BULLETIN 130

Hannifin Corporation
1143 S. Kilbourn Ave., Chicago 24, Illinois

Please send me Bulletin 130 on Hannifin Hydraulic Presses.

Name.....

Title.....

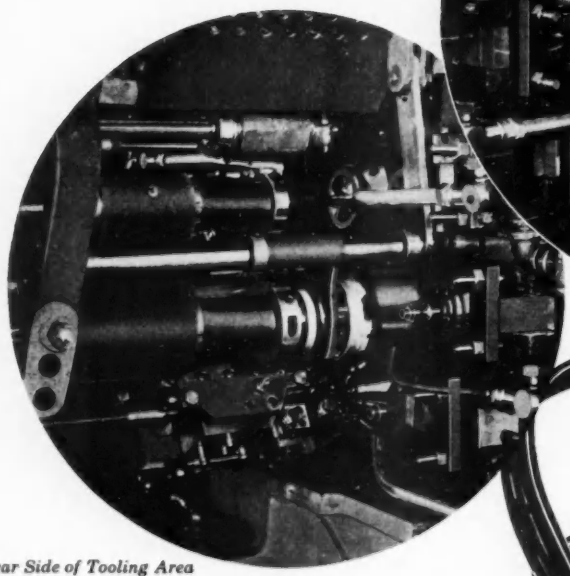
Company.....

Address.....

City.....*State*.....

MORE IN ONE BASKET

Front Side of Tooling Area



Rear Side of Tooling Area

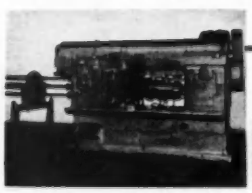
The "automatic" has substantiated many of the advantages of centralized responsibility in metal turning.

Even the earlier users realized that more work pieces can be profitably placed in one basket *if nothing upsets the basket.* Dependable performance has always been vital to the successful use of the "automatic".

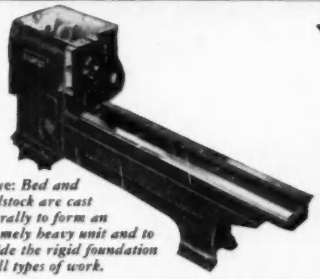
The factors that determine the degree of dependability of an "automatic" are a very important part of its specifications. They are a part of the *complete* information available on CONOMATICS.

In producing the above part on a 1⅝"-SIX, the cycle time of 14 seconds per piece is not as important as the total time necessary for the entire run. Dependable performance pays.

A Comparison of ALL Automatics is in Favor of Cone

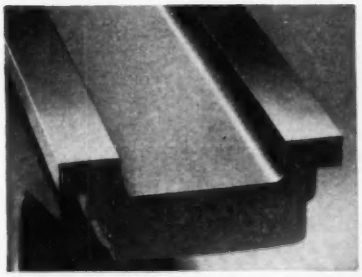


Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



Above: *Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.*

Below: *Block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".*



ACCURACY THAT DOESN'T "WEAR OFF"

Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and maintain—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.

THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

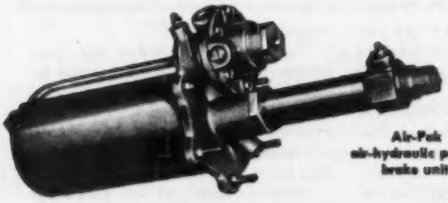
Either Way – YOU'RE ON THE ROAD TO BETTER POWER BRAKING!

There's no need to be puzzled about the question of efficient power braking for *any commercial vehicle*. Where the preference is for a hydraulic system, Hydrovac, with over two and a half million installations, has proven itself the undisputed leader in its field. And for vehicles where air actuated brakes are the choice, the new Bendix Air-Pak air-hydraulic power braking unit is foremost in its field.

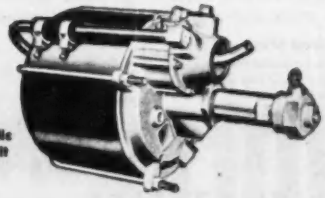
Air-Pak, similar in design and principle to the Hydrovac, changes air pressure into hydraulic pressure by means of two direct connected pistons, thus combining all the well proven advantages of hydraulic brake action with an air brake system.

Products of twenty-five years of practical braking experience, these outstanding power braking systems offer faster, more positive and better controlled braking. And in both the vacuum and the air actuated units, brakes can be applied instantly by foot power alone—a safety factor of tremendous importance. Remember, regardless of size of vehicle or whether your preference is for vacuum or air actuated brakes, for the industry's finest power braking systems—specify Bendix® Hydrovac® or Bendix Air-Pak.

®REG. U. S. PAT. OFF.



Air-Pak
air-hydraulic power
brake unit



Hydrovac
vacuum-hydraulic
power brake unit

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High Spots of This Issue

FOR Free Literature and Information on New Equipment and New Products, use postage-free reply card on page 65.

Chrysler-Delaware Plant's Tank Production

The task assigned to Chrysler at Newark has been described by Ordnance as "the most difficult problem ever given private industry and the most complete in the overall conception of any heavy armament production program." The current installation of immense machinery to implement the program is herewith described and illustrated. Page 32.

Special Machinery for Making Small Parts

This article, third in a series devoted to the new engine plant of De Soto Division, Chrysler Corp., touches upon a few selected operations involving the manufacture of small parts. See page 36.

Sealing the Thunderjet

The important role played by adhesives and sealers in the fabrication of the F-84 Thunderjet fighter at the Farmingdale, N. Y., plant of the Republic Aircraft Corp. is taken up in this interesting account. Page 40.

ASTE Meeting Outdoes Former Events

This year's huge Industrial Exposition featured over 400 exhibits, more than 100 being devoted to machine tools. Included in the article are abstracts from papers presented during technical sessions, as well as observations on foreign machine tools. Page 42.

Forging with Radiant Furnaces at Oldsmobile

Labor-saving changes made in the forge plant of the Oldsmobile Division, General Motors Corp., have simultaneously increased the hourly output of knuckle support forgings by more than 10 per cent. See page 55.

20 New Products Items And Other High Spots, Such As:

Testing automotive equipment under severe Arctic conditions; 10,145 jet engines; construction of the Willys-Overland body and frame; huge spot welders at Ryan and Republic plants; and the economical handling of small castings for engines.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

(*Advertisement*)

RYERSON STEELGRAMS

RYERSON CERTIFIED STEELS

Following are a few paragraphs on the steel situation as we see it here at Ryerson. We hope you will find the information helpful in planning your steel purchasing.

Warehouse steel prices, frozen at 1950 levels throughout 1951, are now determined by new Government formula based on monthly average cost, including transportation charges, plus mark up. In beginning, we adjusted prices monthly to keep within Government Regulation. Now we have established prices on most products sufficiently below OPS ceilings to avoid monthly changes as prices vary.

Steel procurement: Though most steel products are still in short supply, production is catching up with demand on some kinds and sizes. On carbon steel bars, for example, larger sizes are short—but our stocks of smaller sizes are fairly good in both hot rolled and cold finished. And both hot and cold rolled carbon steel sheets are also coming into better supply—especially cold rolled, although 19 gauge and lighter are not in as good supply as the heavier gauges.

Our picture, briefly, on other products: Mechanical tubing—welded in good supply, seamless still tight. Alloy bars—over all stocks improving but still unbalanced as to sizes. Structurals and plates—demand still exceeds supply. And stainless steel—our stocks of nickel-bearing stainless are a little better (but use is still strictly controlled by the Government).

More on stainless—Now you only need money to buy straight chrome stainless—no Government allotments or ratings of any kind are required. And as for money, the straight chrome types cost less than the nickel-bearing stainless steels they replace.

While the use of chrome stainless was originally forced on manufacturers by Government restrictions on nickel, many companies have indicated that they may continue to use it—even when the 18-8 steels are again available. In other words, it took restrictions to reveal the possibilities of 430 and other straight chrome types. Ryerson has large and diversified stocks of these steels.

Another change in alloy steel stocks is taking place in line with a new NPA practice. Steels affected—interim and boron alloys. Warehouses will be limited to .60 nickel and .15 moly in carburizing types and .40 nickel and .15 moly in direct hardening types. These continuing changes emphasize again the importance of knowing exactly how unfamiliar alloys will react—knowledge supplied by the hardenability information sent with every shipment of Ryerson certified alloys.

Under the Government's Mills Plan, corporations must pay 70% of 1951 taxes in the first half of this year, and next year, law requires 80% payment in first half! Until last year, payment of only 50% in the first half was accepted practice. So this represents a considerable shift in the burden of cash requirements and may call for special fiscal planning by many companies. If your steel purchasing picture is affected, we suggest you discuss the matter with one of our experienced credit men.

Fabricators who apply to NPA for ratings to purchase metal working machinery are finding it is not necessary to have contracts directly connected with the defense program. Those with work essential to civilian economy can easily get a rating, too.

Babbitt procurement: Purchase of high tin babbitt still requires an M-8 certification, but Glyco babbitt from Ryerson, which has physicals equal to those of high tin types, is still available to all without a rating of any kind. And Glyco costs only about half as much...Our deliveries on alloy forgings are improving. Wire rope and chain—prompt shipment in a wide range of types and sizes.

As a substitute for cold drawn seamless mechanical tubing, Ryerson tubing specialists are recommending a welded tube identified as bright-finish hot rolled. this tube comes in a wide range of round and square sizes. Costs substantially less than the seamless and has a clean scale-free surface that takes paint very well.

JOSEPH T. RYERSON & SON, INC. STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE • 3-21-52

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 106, No. 8 April 15, 1952

Production of 1,150,000 Cars in Third Quarter Approved

The Government announced recently that the automobile industry will be permitted to produce 1,150,000 cars and 300,000 trucks in the third quarter of 1952. Accompanying the announcement was a statement that removal of all limitations on automobile production is under consideration.

While the industry is obtaining only enough materials to produce 1,000,000 cars and 250,000 trucks during the second quarter, it is permitted to turn out 1,050,000 cars. It is reported that materials sufficient to build 1,050,000 cars and 270,000 trucks will be allotted in the third quarter with the remainder for the full allowance of 1,150,000 automobiles and 300,000 trucks to be made up from inventories of metals.

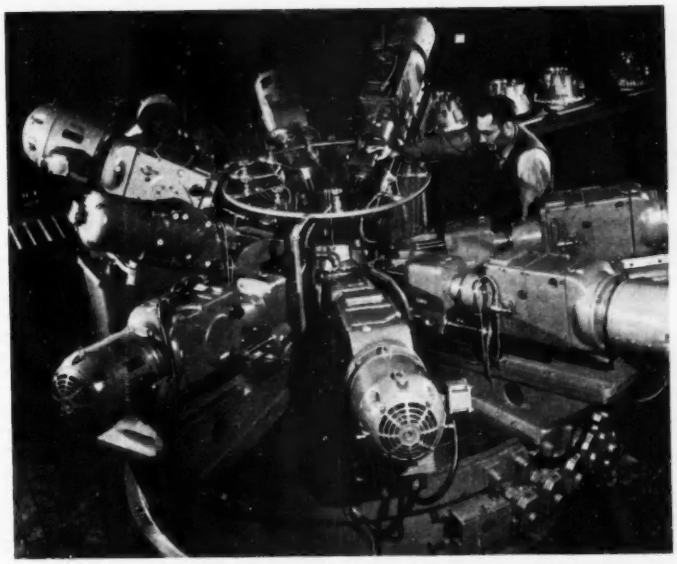
At the same time, the Government announced that steel for consumer goods will be upped by 15 per cent in the third quarter over the second, copper by 19 per cent, and aluminum by 37 per cent. Likewise, supplies of materials for commercial and industrial construction will also be increased.

Ford Awarded Contract for Tools, Facilities at Jet Engine Plant

Ford Motor Co. has been awarded a $20 million contract for tooling and facilities at its jet engine plant in Chicago, Ill. The contract is part of its general $515 million contract for production of Pratt & Whitney J-57 engines. Other contracts announced recently by the U. S. Dept. of Commerce include one for $6.5 million to Great Lakes Steel Corp. for structural steel and one for $1.070 million to Motor Wheel Corp. for shell parts.

Hudson Suffered Loss for Fiscal Year 1951

Hudson Motor Car Co.'s operations for 1951 resulted in a loss of $1,125,-210.06, compared with a profit of $12,-002,274.45 for 1950. Sales volume totaled $186,050,832.92 compared with $267,219,749.92 for the previous year.



VERSATILE DRILL

A new Kingsbury automatic drill, seen in operation at the Chicago Aircraft Div. of Ford Motor Co., drills, reams, taps, or countersinks eight holes in a magnesium propeller shaft case for a Pratt & Whitney engine.

Production of New Pontiac Engine Remains Uncertain

While it is known that Pontiac Motor Div. of General Motors Corp. is considering production of a new high-compression, V-type engine, there appears to be no conclusive evidence at the moment to substantiate a recent report that Pontiac has already ordered the tooling for it. Due to the yet-cloudy machine tool situation, it is extremely uncertain when such an engine may be ready for production.

Chrysler Announces C-200 Experimental Convertible

Chrysler Corp. has announced a new experimental convertible, the C-200, whose body and assembly were executed at the Ghia works in Italy. Said to stand less than five ft from the ground, the car's European characteristics are seen in the wire wheels and the long hood line. The vehicle is powered by a standard Chrysler Firepower V-8 engine. The frame is a standard, 125½ in. wheelbase Chrysler unit, built in Detroit and shipped to Italy for body installation.

Douglas to Produce RB-66 Bomber in Chicago Plant

Douglas Aircraft Co. has been assigned a Government-owned plant in Chicago, Ill., for production of the Air Force RB-66 reconnaissance bomber. This plant was previously scheduled to be used by Fairchild Engine & Airplane Corp. for production of the C-119, but this project was cancelled recently.

News of the AUTOMOTIVE

High Output of Machine Tools for the Next Three Years Forecast at Recent Westinghouse Electrification Forum

The current pace of the machine tool industry will continue for many months to come, with operations at a high level well into 1954, according to officials of the National Machine Tool Builders Association. The backlog of orders is now $1.5 billion and new orders, which are being received at an average rate of $100 million a month, are expected to total $1 billion from now until the end of the year.

Monthly shipments of machine tools have been increasing rapidly, but as yet have not overtaken incoming orders. During Jan., 1951, the industry produced $33.8 million worth of machine tools and by the end of last year the monthly shipments of machine tools had more than doubled in value. Shipments during Dec., 1951, totaled $78.25 million. In February of this year machine tool shipments reached $81.6 million, which does not include the $5 million worth of presses shipped.

The above figures and other significant data were announced by Frederick S. Blackall, Jr., president, and Tell Berna, general manager, of the NMTBA at the 16th Annual Machine Tool Electrification Forum of Westinghouse Electric Corp., held April 1-2 at Buffalo, N. Y. The forum featured a two-day program of addresses, technical papers and reports, and discussion sessions. It was declared the most successful of these affairs since they began in 1936. Attendance this year was close to the 400 mark, including 128 men from Westinghouse, with 125 companies represented.

New Machines, Industry Needs

A new knee-type, contour-copy milling machine, developed by Kearney and Trecker Corp., was described by Theodore A. Wetzel, supervisor of development engineering at that company. It is equipped with an optical type pickup that engages its guiding pattern and an automatic control system for its feed rates up to 100 in. per min.

Prof. W. M. Pease discussed the numerically-controlled milling machine being developed by the Electrical Engineering Dept. at Massachusetts Institute of Technology. Among the outstanding papers was one on the machining of high temperature alloys presented by P. G. DeHuff, Westinghouse metallurgical engineer.

During his talk Mr. Blackall, who also heads the Taft-Peirce Mfg. Co., declared that a national machine tool reserve program is essential to the security of America, but cautioned that the periodical discarding of them should avoid prostrating the machine tool builder and the foisting of obsolete equipment upon American industry.

Tell Berna pointed out that although the machine tool industry has a huge backlog of orders, the load is not evenly distributed and a few companies can make almost immediate deliveries. For that reason, they believe the National Production Authority should relax the restrictions on unrated orders to enable them to keep their plants operating.

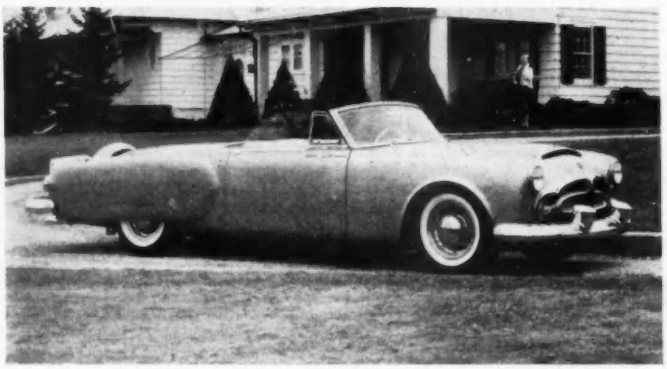
Changes in Chevrolet Engine are Rumored

Reports have circulated that Chevrolet Motor Div. of General Motors Corp. will up the horsepower of its engine and adopt a pressurized lubrication system and aluminum pistons, perhaps by 1953. This has not, however, been confirmed officially by Chevrolet. Furthermore, it, like many other manufacturers, is known to have a new engine under consideration, but the answer to the question as to when such engines will become production realities hinges upon several extremely uncertain factors such as the machine tool situation.

Flying Car, Plastic Body, and Three-Wheeled Vehicle at Show

The International Motor Sports Show, held in New York City March 29 to April 6, featured a number of unusual exhibits that attracted large crowds of automobile enthusiasts. In addition to a complete array of antique, foreign-made, and custom cars, the display included such novelties as the "Airphibian," a combination automobile and car, and a plastic automobile, the British Singer SM 1500 sports convertible. The chassis and engine for this car are built in England, but the body, molded in one piece from vibrin polyester plastic reinforced with glass fiber, is produced in the U. S.

Revolving on a large platform in the center of the main exhibit area was the Packard Pan American sports car (see photograph opposite), designed by Richard Arbib and custom-built by Henney Motor Co. Other prominent points of interest were occupied by the "Jetmobile," a three-wheeled futuristic car powered by a rear, four-cyl, 75-hp Lycoming aircraft engine, and a reconditioned "Bluebird," the famed racing car of the late Sir Malcolm Campbell.



PACKARD PAN AMERICAN

One of several sample sports cars under consideration for production by Packard Motor Car Co., the Pan American has a height of only 36 in. to the top of the door. The "Thunderbolt" engine of the three-passenger car has been upped to 175 hp by increased carburetion and revised cylinder head.

AND AVIATION INDUSTRIES

Ford Cleveland Engine Plant Reported in Full Operation

Ford Motor Co. has announced that its new Cleveland, O., engine plant, which is said to employ to the fullest possible degree the principles of "automation," is now in complete operation. The plant, which contains over 1 million sq ft of floor space, is currently producing Ford's new six-cyl, overhead valve engine and will shortly turn out Mercury eight-cyl engines as well. The operation is planned to produce more than 4500 engines daily of both makes.

A modern foundry, built alongside the engine plant, is expected to be completed and in operation this month. This facility contains 1.2 million sq ft of floor space.

Kalamazoo Stove and Maremont Merger is Being Considered

It is reported that Kalamazoo Stove Co. is considering a possible merger with Maremont Automotive Products, and a stockholders meeting is scheduled for the near future to decide the matter. As the plan stands, Maremont would be merged into Kalamazoo Stove with the company thus formed called Kalamazoo - Maremont Manufacturing Co.

The proposed new company's line of products would include parts for automobiles, aircraft, tanks, and farm equipment. Kalamazoo Stove recently sold its stove and range business to Nash-Kelvinator Corp.

Sealed Power Buys Koppers Division

Sealed Power Corp. has announced the purchase of the automobile piston ring replacement business of the Metal Products Div. of Koppers Co., Inc. The disclosure was made shortly after Koppers reported that it planned to discontinue production of automobile piston rings at its Baltimore, Md., plant to concentrate on the manufacture of aircraft and industrial rings. The operation and inventory will be transferred from Baltimore to Muskegon, Mich.

Perfect Circle Acquires Centrifugal Foundry Co.

Perfect Circle Corp. has announced the purchase of Centrifugal Foundry Co. For the time being, Centrifugal will be operated as a subsidiary of Perfect Circle and will retain its own name.

SECOND 1952 WILLYS

The second model of the Willys 1952 passenger car line is the Aero Ace. Mechanically similar to the previously introduced Aero Wing, its 70-in. wrap-around rear window is said to combine with wide side windows and a broad front windshield to afford an unusual degree of visibility.

Possible Atlas, Convair, K-F Merger is Studied

According to a recent report, discussions are under way concerning the possible merger of Atlas Corp., Consolidated Vultee Aircraft Corp., and Kaiser-Frazer Corp. A decision on the negotiations is expected shortly.

Thompson Drops Muskegon Merger Negotiations

According to a recent report, Thompson Products, Inc., has cancelled plans to absorb Muskegon Piston Ring Co. Discussions of a merger of Muskegon with Thompson have been under way since August, 1951, but it was stated several months ago that there was some feeling on the part of the Justice Dept. that such a merger might be inconsistent with the anti-trust laws.

Packard Sales, Earnings, and Production Evidence Increase

Earnings of $5,594,060, equal to 38 cents a share, were reported recently by Packard Motor Car Co. in its 1951 annual report. These compare with 1950 earnings of $5,162,348, equal to 34 cents a share. Estimated income taxes of $5.5 million slashed the company's gross income nearly in half for the year and were more than double the sum provided in 1950.

Packard consolidated sales and other incomes in 1951 were $179,550,724, as compared with $174,415,663 in 1950. Production totaled 76,075 cars in 1951, an increase of nearly 4,000 units over 1950 output.

Studebaker Sales Set Record Despite Decline in Income

Sales of Studebaker Corp. in 1951 established a record of $503,308,865.88. Consolidated net income in 1951 amounted to $12,623,129.66, compared with $22,506,828.60 for 1950. Sales in 1951 increased $26,242,501.14 over the previous record mark of $477,066,364.74 established in 1950.

ACF-Brill Earnings in 1951 Reached Noteworthy Peak

ACF-Brill Motors Co. scored the highest earnings in its recent history for the fiscal year ended Dec. 31, 1951. Net profits amounted to $2.507 million, as compared with a net loss of $124,000 during 1950. Net sales during 1951 totaled $23.615 million, as compared with $12.572 million for 1950.

Allis-Chalmers Profit Off as Sales Rise a Third

In spite of a 33 per cent rise in sales, an 86 per cent increase in taxes cut Allis-Chalmers Manufacturing Co.'s net profit from $23,119,853 in 1950 to $22,416,813 in 1951. Net sales for 1951 were $457,060,766 in 1951, compared with $343,698,400 in 1950.

News of the AUTOMOTIVE

Rotary Ovens Installed in Buick Forge Shop

Buick Motor Div. of General Motors Corp. has announced that it is installing six new rotary ovens in its forge shop for use on defense work. Three of the ovens are 17 ft, 3½ in. in diameter, two are 11 ft, 6 in., and the last is 14 ft. The bigger ovens will be used to heat metal for the large hammers which will forge parts for the CD-850 tank transmission. The others will be employed on the Wright J-65 Sapphire jet engine project.

Ford Sets up a New Design Department

Ford Motor Co. has announced the establishment of a new department which will concern itself solely with future passenger car design. Separated from current production engineering, it will concentrate on future technical improvements in setting up specifications for advanced designs.

Aluminum Bearings Foreseen in Car and Truck Engines

There is evidence that after many years of experimentation at least one major engine bearing producer is completing installation of a mass-production aluminum strip bearing line. Others are carrying on experimental work in the development of the same type of thin-wall, steel-back aluminum bearing which is said to have many important advantages for passenger car and truck engines. There are indications that the strip mill now going into operation will serve a prominent passenger car producer on its 1953 models.

Aluminum Radiator Developed by GM Harrison Division

Harrison Radiator Div. of General Motors Corp. has reportedly developed an experimental all-aluminum radiator. Use of the radiator on a production basis is unlikely in the immediate future, but it is said to have distinct possibilities.

Some Percentage Rises Seen for Automatic Transmissions

As a result of the National Production Authority's recent revocation of its Order M-68, some manufacturers are expected to up their production of cars with automatic transmissions. Buick Div. of General Motors Corp., for example, has announced that it plans to increase Dynaflow output from 82 to 88.7 per cent of total production.

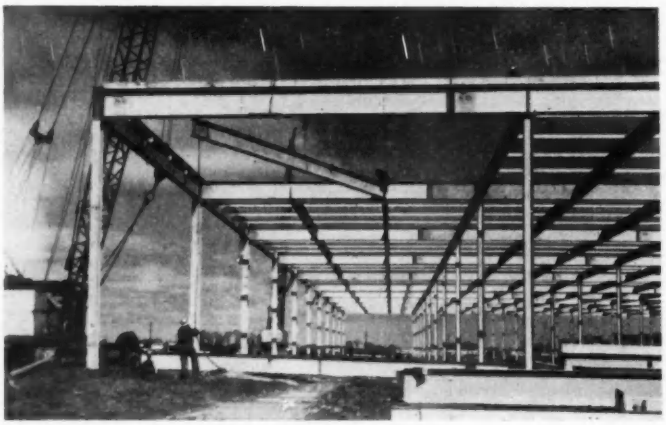
Other General Motors Corp. divisions are expected to follow suit, with Pontiac probably stepping up from approximately 74 per cent to about 88 per cent. Oldsmobile reportedly anticipates raising its output to approximately 98 per cent. Cadillac was not affected by the previous restrictions because none were placed on cars in the over-$2500 (factory price) class. Due to materials difficulties, Chevrolet, for the time being, will probably remain at around 35 per cent as far as its Powerglide is concerned.

Ford Div. of Ford Motor Co. is said to be planning no particular increase on its Fordomatics over the present 35 per cent for the time being, although demand is reported good. Mercury output of automatic transmissions has been in the 50 per cent class, and no immediate change is anticipated.

Since Studebaker Corp. has offered an automatic transmission for only a relatively short time, its output of the device reportedly has not been up to previous limitations. As a matter of fact, the demand for Studebaker overdrive is still said to exceed that for the automatic transmission.

In view of the fact that Packard Motor Car Co. offers only one model in a factory price range below $2500, the lifting of restrictions on percentages of automatic transmission output has affected it little. Demand for Ultramatic on the above price leader is said to run only in the neighborhood of 30 per cent, and it is not planned to increase this at the present time.

Although it has three models in the below-$2500 class, a similar situation prevails with Hudson Motor Car Co., since it had not been using the full percentage quota of automatic transmissions allowed for these price leaders under the previous limitations. Nash Motors Div. of Nash-Kelvinator Corp. also reports that it has no immediate plans to offer more cars with Hydra-Matic.



JET PLANT UNDERWAY

Construction has started on Chrysler Corp.'s jet engine plant, near Detroit, Mich., as seen in this view of the main manufacturing building. Located on a 306-acre tract, the plant will contain 2-million sq ft.

Argentina Reveals Plans for Small Car Production

The Government of Argentina recently announced that it is starting production of a two-cyl, four-passenger car and hopes to have 5000 of them operating within a year. The engine will develop 23 hp, and the car will have a top speed of approximately 60 mph.

1952 Studebaker Selected as Indianapolis Pace Car

Studebaker Corp. recently announced that one of its 1952 models has been selected as the pace car in this year's 500-mile Memorial Day race at the Indianapolis Motor Speedway.

AND AVIATION INDUSTRIES

Aluminum Plated with Nickel by Process Using Rubber

Hamilton Standard Div of United Aircraft Corp. and Bart Laboratories Co., Inc., recently announced jointly the development of a new process for the nickel coating of aluminum which is said to give a stress-free, hard, yet resilient coating. The vital element in the process is a synthetic rubber compound that establishes a previously unattainable bond between aluminum and nickel-plate.

According to the announcement, the bond material is sprayed on aluminum to the necessary thickness. Once dry, the piece is plated with nickel by customary means, again to the required thickness. The plating process is said to take approximately 24 hours. It is claimed that the process has been used with notable success on aircraft propeller blades for the Air Force and Navy.

Republic Establishes Guided Missile Div.

Creation of a division of Republic Aviation Corp. to research and develop advanced types of transonic and supersonic guided missiles has been announced. While the firm has been active in guided missile work for several years, the division is said to be the first in this field to be created by the company.

Chevrolet Builds 27 Millionth Car

Chevrolet Motor Div. of General Motors Corp. has announced that its 27 millionth car recently came off the assembly line. The particular vehicle marking the milestone was built at Chevrolet's Kansas City, Mo., plant. It was turned out eight months and 22 days after production of the 26th millionth.

AMA to Conduct Survey of Trucking Industry

The Automobile Manufacturers Association is planning to conduct a survey of the trucking industry to test its general standing with the public. Approximately 4000 personal interviews will be held by an independent research organization on such questions as driver courtesy, truck road taxes, truck adherence to safety laws, etc., thereby to gain a representative cross-section of opinion.

ECONOMY RUN COURSE MAP

The official course for the Mobilgas Economy Run (see April 1 issue of AUTOMOTIVE INDUSTRIES, p. 19) is a rugged 1415.4-mile route between Los Angeles, Calif., and Sun Valley, Ida. A longer and more rigorous test of performance and mileage capabilities, the course will take the competing 1952 passenger cars through temperatures ranging from below zero to over 100 deg. Altitudes vary from more than 8000 ft to 70 ft below sea level.

Morris, Austin Take New Designation

Morris Motors, Ltd., and Austin Motor Co., Ltd., the two British automobile firms which recently announced a merger, have disclosed that their mutual enterprise will be known as British Motor Corp. Lord Nuffield, founder of Morris, heads the new organization.

Union Health Benefits Total $125 Million

Benefits received by members of the UAW-CIO from health security programs under contracts with employers exceeded $125 million last year, according to the International Union. The largest single item was hospitalization benefits, which totaled $50 million to 385,000 union members and their dependents. The second highest amount, $27 million, went to 168,000 unionists for temporary disability benefits.

Benefits to widows, children, and other survivors of the 8500 UAW members who died last year totaled $26.4 million. Total life insurance in force on union members last year was $4 billion, with an average coverage for survivor benefits of $3200 on death before retirement and from $500 to $1000 for the remainder of life after retirement. Surgical-medical benefits in 1951 totaled $23 million for 320,000 surgical operations and 900,000 doctor's visits.

The union estimates that in any one day last year 16,000 members were actually receiving temporary disability benefits and that the average disabled worker drew benefits amounting to $160 for five weeks. An additional 5000 remained disabled for the maximum period of 26 weeks and received from $780 to $1200 to help replace lost wages.

Willys Builds Its Millionth Jeep

Willys-Overland Motors, Inc., recently completed the millionth utility-type vehicle to be produced by the company since the first military Jeep was built in Nov., 1941. The vehicle which held the special distinction was a red and gray civilian Jeep destined for shipment to Texas.

News of the AUTOMOTIVE

1952 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1952	Totals 1950
January	273,572	101,060	778	375,410	606,833
February	333,885	100,606	625	435,116	618,321
Total—Two Months	607,457	201,666	1,403	810,526	1,225,154

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	35,127	17,632	5,914	22,409	6,398	9,176	4,234	101,060
February	34,455	18,114	6,251	23,278	5,149	9,132	4,227	100,606
Total—2 Mos., 1952	69,582	35,946	12,165	45,687	11,517	18,308	8,461	201,666
Total—2 Mos., 1951	105,268	43,188	15,478	43,343	13,038	12,333	6,872	239,518

* Automobile Manufacturers Association.

Studebaker May Build New Plant in Texas

Studebaker Corp. is reported to be considering Texas as a possible site for one of several new plants. The exact location of the Texas site for assembly facilities has not been revealed.

GM of Canada to Build a New Truck Plant

General Motors of Canada, Ltd., has announced that work will begin shortly on a new $10-million truck assembly plant near Oshawa, Ont. Scheduled for completion early in 1953, the new facilities are expected to have a production capacity of 50,000 units a year.

Chrome Seen on Increase in Plating and Stainless

There is growing evidence that the thickness of chrome plating on cars will be steadily increased as the materials situation eases. It is also expected that the proportion of chrome in stainless steel will rise as the supply picture brightens.

Car Price Rises Much Smaller Than Those of Other Products

Conclusive evidence to support the assertion that prices of today's automobiles have risen less proportionately than those of other commodities is contained in an article appearing in a recent issue of *Automobile Facts*, published by the American Automobile Manufacturers Association.

According to the article, the average worker in the U. S. now has 156 per cent more net income than he had in 1940. At the same time, the average new car price has risen only 136 per cent. Furthermore, the U. S. Bureau of Labor Statistics reports that, with the exception of chemicals, motor vehicles have increased less in price during the past 10 years than any other major commodity group.

Calumet & Hecla Intends to Produce Steel Tubes

Calumet & Hecla Consolidated Copper Co. has disclosed plans to enter the steel tube field. The step is reportedly being taken as part of the company's expansion program and to atone for the loss of part of its copper and brass business as a result of the continuing copper shortage.

It is stated that equipment for production of welded and brazed steel tubes will be installed this year in the Detroit, Mich., plant of the company's Wolverine Tube Div. The firm recently signed a contract with the Navy to manufacture five-in. steel shell cases.

Allegheny Ludlum Reviews Its 1951 Technical Developments

In a technical summary accompanying its recent annual report, Allegheny Ludlum Steel Corp. pointed out several interesting developments during 1951. First, it was stated that new high temperature steels employing smaller amounts of scarce alloying materials were made available for the jet engine aircraft program, and while shortages of nickel eliminated widespread use of 18-8 stainless steel, definite progress was made in the development and application of straight chromium stainless alloy.

Second, other phases of research involved development of new and distinct processes for making steel. The company believes that a process dealing with the hot extrusion of steel will be put into use in the near future. The firm's first hot extrusion press, developed from a French process, is expected to go into production this month.

Third, the company states that development work has progressed considerably on the continuous casting process in which it has been interested. It is said that consideration is being given to using this process in conjunction with extrusion.

Finally, the company states that production of its special heat and corrosion-resistant steel for exhaust valves was appreciably affected by the Government cutback in automobile production. The resulting drop in demand was reportedly greater than the increased rise in demand for valve steels by the expanding aircraft industry.

Automatic Hood Transfer Line Cuts Buick Employee Fatigue

Buick Motor Div. of General Motors Corp. has reported that an automatic transfer line has done much to reduce worker fatigue on its hood press operations. Two operators place the hood blanks in the first press, but from that point they are transferred from one press to another by automatic equipment. "Iron hands," which operate on compressed air, lift the hoods out of the presses and deposit them on conveyors.

The conveyors transport the hoods to the next press and drop them onto the die. The operators merely guide them and remove the scrap. In addition to reducing worker fatigue, the automatic transfer system is also said to reduce the possibility of scratching or marring the metal.

Packard Year-End Inventories Of Cars Far Above 1950 Level

Packard Motor Car Co. has reported that the value of its inventories of automobiles was eight times as large at the end of 1951 as it was at the close of 1950. The value of the car stocks was set at $11,141,463, or approximately $10 million more than at the end of 1950. The rise was attributed by company officials to dealer reluctance to stock cars.

Bendix Radio Opens Offices in Detroit

Bendix Radio Div. of Bendix Aviation Corp. has announced the opening of offices at 261 McDougall Ave., Detroit, Mich.

AND AVIATION INDUSTRIES

Chrysler Institute Chalks Up Large Enrollment of Students

At a recent meeting of the Detroit Section, National Association of Cost Accountants, Paul C. Ackerman, chief engineer of Chrysler Corp.'s Engineering Div. Laboratories, stated that more than 50 per cent of the engineers employed in the Engineering Div. have graduated with degrees of Master of Automotive Engineering from the Chrysler Institute of Engineering since its founding in 1931.

The Institute conducts evening and special courses, in addition to its regular post-graduate school, for Chrysler employees. Evening school enrollment, depending upon the season of the year, is reported to range between 500 and 800 students.

Detroit Diesel Division Wins Suggestion Award

The Detroit Chapter of the National Association of Suggestion Systems recently announced that its annual award for the greatest improvement in employee suggestion plan activity had been won by Detroit Diesel Engine Div. of General Motors Corp. for 1951. Detroit Diesel's improvement in quantity and quality of ideas from employees was reported to exceed that of all other Detroit companies entered in the competition.

United Aircraft Corp. Adds Landing Gear to Missles

United Aircraft Corp. recently announced that its Chance-Vought Div. is perfecting a guided missile which reportedly can be brought to a landing after test flights without damage. It is said that the missile is equipped with landing gear and directed back to earth by radio after test firing. A number of them are reported to be in limited production for intensive experimental use.

Tinted Glass Curbs Snow Glare Hazard

An added advantage from tinted glass in windshields and side windows of automobiles is the protection it affords from snow glare. Dr. George B. Watkins, research director for Libbey-Owen-Ford Glass Co., recently stated that tinted glass was developed primarily to reduce overhead sun glare and heat, but also is proving very effective in reducing the dazzling glare of snow-lined highways.

He added that snow has from three to ten times the brightness of a beach. The use of tinted glass took a sharp upturn last year, with about 200,000 cars thus equipped now on the highways and the number expected to be doubled by the end of this year.

Reo Sales and Net Both Increased During 1951

Reo Motors, Inc., has reported a consolidated 1951 sales volume of $112,756,340, an increase of 96 per cent over 1950 sales of $57,353,258.

For the year ended Dec. 31, 1951, the company also reported a consolidated net profit of $2,422,394, compared with $2,142,309 in 1950. These figures include the fully consolidated accounts of the company's wholly-owned subsidiary, Reo Motor Co. of Canada, Ltd.

International Harvester Net Cut by Tax Rise

Although sales last year hit a record high of more than $1.27 billion, soaring Federal taxes cut International Harvester Co.'s earnings for the fiscal year ending Oct. 31, 1951, to slightly more than $63 million, compared with $66.7 million the previous year. Military products last year accounted for 6.8 per cent of total sales.

Motor Wheel Earnings Decline As Sales Volume Hits Record

In its recent annual report, Motor Wheel Corp. stated that its 1951 sales totaled a record $74,473,118, compared with $63,341,751 in 1950. Net earnings, however, dropped from $4,621,616 in 1950 to $2,959,785 in 1951.

Allis-Chalmers Weighs $15 Million Expansion

General approval to a project costing approximately $15 million for increased facilities of the Springfield, Ill. Works, Tractor Div., was given recently by the board of directors of Allis-Chalmers Manufacturing Co.

More than 300,000 sq ft of manufacturing floor space, and the necessary machine tools for increased production of crawler tractors, motor graders, and repair parts will be included in the program. Preliminary plans are being drawn, and it is expected construction will get under way before the middle of the summer.

Kansas City Auto Show Attracts Large Crowd

A huge crowd of 176,000 persons is reported to have set a record at the recent eight-day Kansas City, Mo., Auto Show. Sponsored by the Motor Car Dealers Association of Greater Kansas City, the affair is said to have resulted in numerous sales of the 19 car makes and five truck lines on display and aroused considerable prospect interest.

Champion Supports Stock Car Races

Champion Spark Plug Co. has declared its support of the National Association of Stock Car Auto Racing events for 1952. The company has announced its intention to donate $5000 to the association's point prize fund which will be divided among leading drivers in the five sections of the organization at the end of the year.

(*Turn to page 70, please*)

1952 PASSENGER CAR PRODUCTION
CHRYSLER AND GENERAL MOTORS CORPS.

(As reported by the car factories)

	March 1952	February 1952	March 1951	Three Months 1952	Three Months 1951
Chrysler	10,568	10,940	16,253	31,923	40,603
De Soto	8,238	7,384	10,521	24,326	25,536
Dodge	18,920	20,681	34,732	61,992	84,751
Plymouth	38,806	38,009	65,378	111,579	176,042
Total—Chrysler Group	76,532	77,022	126,884	229,420	326,932
Buick	26,440	24,642	42,986	76,936	121,051
Cadillac	7,370	6,960	10,054	20,376	29,684
Chevrolet	72,390	67,861	123,700	210,200	334,801
Oldsmobile	18,903	17,265	36,120	54,259	85,183
Pontiac	22,303	20,573	37,103	64,867	102,736
Total—G. M. Group	147,306	137,321	249,963	426,470	673,455

A car's best friend is its value

THERE'S one asset that stands a car in good stead all through its life.

An asset that helps to clinch a new-car sale even after the prospect's first enchantment over style, color, and advanced features has worn off.

That keeps a car-buyer sold on the car he has bought, even after long years of hard service.

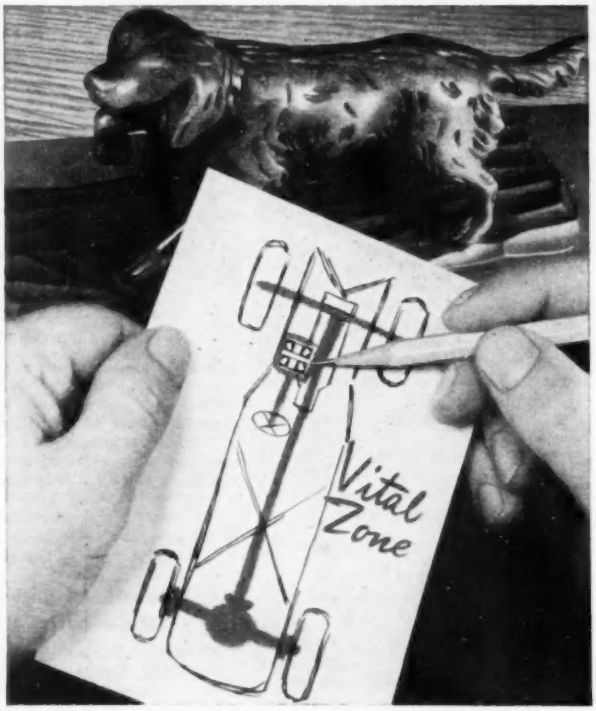
That boosts a car's saleability on the used-car lot.

The asset is *value*—a car's best friend in *every* need.

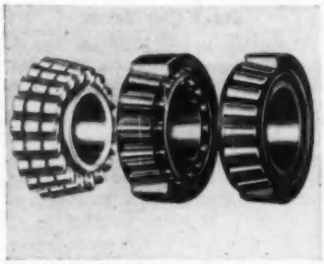
Today value counts with customers more than ever. Especially in the moving parts—the "vital zone". To give the customers the "vital zone" value they look for, you may find this formula helpful when appraising component parts:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

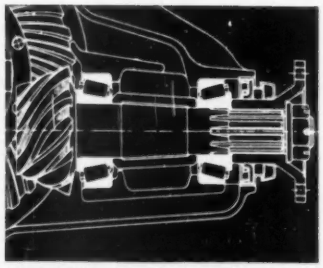
It shows that price is only one factor in value, and must be weighed in relation to the factors *above* the line. Timken® bearings give you far more above the line than any other tapered roller bearings. Higher quality, better service, and more public acceptance. And in terms of value features, Timken bearing prices are lower today than ever. The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



FIRST TAPERED ROLLER BEARING was pioneered by the Timken Company in 1899. Since then, every major design improvement has come from the Timken Company. Above: two early designs and today's (right). Design leadership is a big reason for Timken bearings' value.



ALL BUT TWO makes of cars have Timken tapered roller bearings on the pinion — toughest automotive bearing application. It's proof of the preference for Timken bearings where value counts the most—in pinions, wheels, differentials, steering gears—the "vital zone" of the car.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

"TRADE-MARK REG. U. S. PAT. OFF

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION ✳

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Willys - Overland Motors, Inc.—William H. Peters has been appointed manager of manufacturing.

Chrysler Corp., Engineering Div.—**Stephen J. Tompkins** has been chosen assistant chief engineer of the truck design section.

General Motors Corp., Detroit Diesel Engine Div.—**James A. Hall** has been appointed chief project engineer.

Calumet & Hecla Consolidated Copper Co., Wolverine Tube Div.—**Thomas E. Wilder** has been named assistant advertising manager.

Ford Motor Co.—**Franklin Q. Hershey** has been chosen technical assistant in the Styling Dept.

Krylon, Inc.—**Aaron McKay** has become president.

Tinnerman Products, Inc.—William H. Gibbons has been made advertising manager.

Ryan Aeronautical Co.—**L. M. Limbach** has been named works manager.

Twin Disc Clutch Co.—**Donald E. Benton** has been chosen assistant general manager.

Mack Manufacturing Corp.—Norman F. McCarthy has been elected vice president and made director of purchases.

Timken-Detroit Axle Co.—**Frederick W. Parker, Jr.,** has been promoted to executive vice president. **George J. Finzel** has been made controller, succeeding **Louis C. Haltug,** who has been named assistant general manager of the Wisconsin Axle Div.

Scovill Manufacturing Co., Inc., A. Schrader's Son Div.—**Garvin A. Drew** has been appointed vice president in charge.

Reo Motors, Inc.—**Allan H. Wright** has been appointed assistant comptroller.

Holley Carburetor Co.—B. R. Tabbert has been appointed truck sales manager.

Gar Wood Industries—**W. A. Glimn** has been appointed director of purchases, and **W. C. Robertson** has been appointed vice president in charge of Government sales and regulations.

Heald Machine Co. — **Fredrick J. Underwood** has been appointed publicity manager, and **Philip J. Warren, Jr.,** assistant publicity manager.

White Motor Co., Truck Div.—**Kenneth F. Ode** has been appointed manager.

Willys-Overland Motors, Inc.—**Raymond M. Chitwood** has been chosen to handle special assignments.

Mack Motor Truck Corp., Export Div. —**F. W. Beardslee** has been named general manager.

Fageol Products Co., Motor Coach Engine Div.—A. F. Siers has been named sales manager.

Vickers Inc.—Waterbury Tool Div. — George C. Kastner has been chosen chief engineer.

Universal Products Co., Inc.—**V. H. Kendall** has been elected president.

(*Turn to page 78, please*)

Necrology

Harry T. Woolson, 75, retired executive engineer for Chrysler Corp. and former president of the Chrysler Institute of Engineering, died March 23, in St. Petersburg, Fla.

Albert G. Partridge, 71, vice chairman of the board of directors of Goodyear Tire & Rubber Co. of Canada, Ltd., died March 12, in Toronto, Canada.

Chisholm N. Macdonald, 53, president of Gear Grinding Machine Co. and Formsprag Co., died April 1, in Jamaica, British West Indies.

Foster L. Fralick, 65, president of the Automotive Tool and Die Manufacturers Association, died March 30, near Honolulu, T. H.

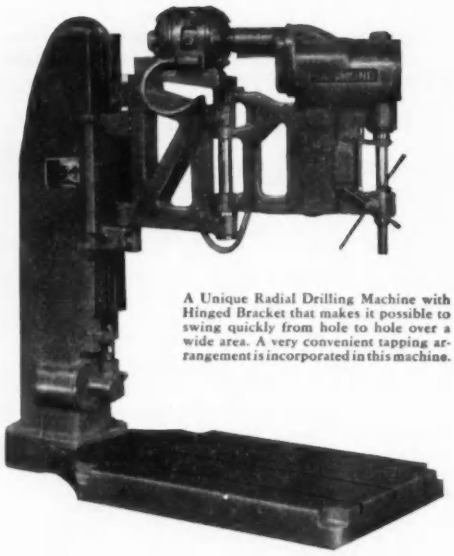
John G. Munson, 67, former vice president-raw materials, U. S. Steel Corp. of Delaware, died March 29, in Pittsburgh, Pa.

George H. Nye, 68, president of Circular Tool Co., died March 19, in Chicago, Ill.

Roscoe C. Overstreet, 64, purchasing agent for Tinnerman Products, Inc., died March 14, in Cleveland, O.

Lindol R. Meyers, 81, retired president and treasurer of Monarch Tool and Manufacturing Co., died March 23, in Cincinnati, O.

Robert E. Powers, 57, a B. F. Goodrich Co. public relations man, died March 30, in Akron, O.

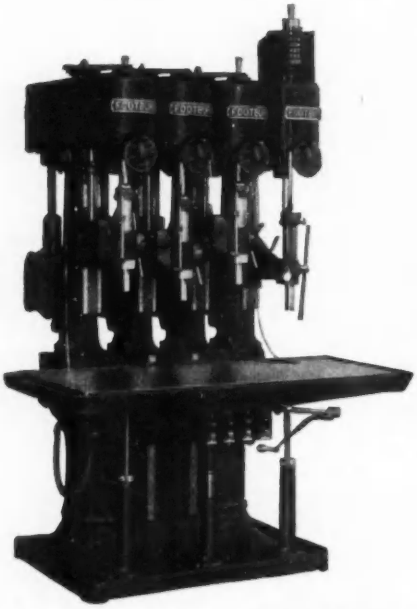


A Unique Radial Drilling Machine with Hinged Bracket that makes it possible to swing quickly from hole to hole over a wide area. A very convenient tapping arrangement is incorporated in this machine.

FOOTBURT

machine tools

A TIME TESTED LINE OF MACHINE TOOLS



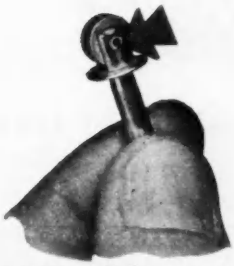
Built in 1, 2, 3, 4 and 6 spindle models, also as a tool room drilling machine, these sensitive drilling machines are accurate for the most exacting work and have the usual Footburt sturdiness of construction to make them suitable for continuous production line work. The above 4 spindle machine has tapping attachment and power feed attachment.

engineered for production

● The choice of fine machine tools is an investment for future profits when products have to be made with increased accuracy and efficiency. ● These machines are built with the usual Footburt workmanship and sturdiness that will keep them accurate over a long period.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

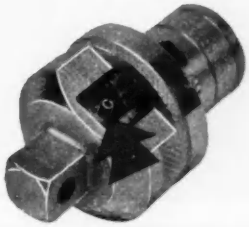


AS A SHAFT . . . Rollpin serves as an axle for the sparkwheel of a cigarette lighter. No riveting or threading necessary . . . faster assembly. Note flush, clean fit.

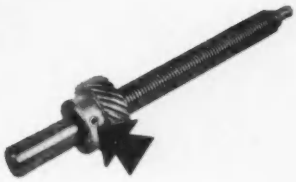
AS A DOWEL . . . Rollpin is used here to prevent rotation of a thrust bearing. No reaming, no special locking. Easily removed. Lowest possible dowel pin cost.

AS A CLEVIS PIN . . . here Rollpin holds firmly in clevis, permits free action of moving member. Rollpin application above is with the plate of a home workshop tool.

AS A KEY . . . Rollpin demonstrates its ability to do away with precision tolerances, in this heating system damper arm. Faster, cheaper and more satisfactory than usual assemblies.



AS A STOP PIN . . . in this application, Rollpin is shown in a ratchet wrench adaptor. With its light weight and high shear strength, Rollpin functions perfectly . . . cuts assembly costs.



AS A SIMPLE FASTENER . . . Rollpin replaces a set screw in pinning a gear to a shaft. Assembly time is shorter, service life longer. Vibration-proof flush fit. Easily removable.

YOUR IMPORTANT FASTENING JOBS

are cheaper . . . faster, with ROLLPIN TRADE MARK

Rollpin is a pressed-fit pin with chamfered ends. It drives easily into holes drilled to normal tolerances, compressing as driven. No reaming, no tapering, no extra assembly steps required. Rollpin fits flush, *locked* in place by the constant pressure it exerts against the hole walls. Can be inserted with automatic press, or by hand—removable with a drift or pin punch.

Rollpin is reusable again and again.

Elastic Stop Nuts with the famous red collar are another ESNA product

MAIL COUPON TODAY. If your present operations or plans include the above applications—or set screws, rivets, hinge pins, cotter pins, pivot pins, taper pins—you can't afford to be without complete details on Rollpin. Write now—find out how much faster and cheaper Rollpin can do the job.

Section R1-45, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free information on ESNA self-locking fasteners:

☐ Rollpin bulletin and sample Rollpins ☐ AN-ESNA conversion chart
☐ Elastic Stop Nut Bulletin ☐ Here is a drawing of our product. What fastener do you recommend?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

Drilling Problem?

Black & Decker's Drill Line is a good bet to solve it!

Completeness of Line, Quality Construction Pay Off for-Users!

FOR drills to fit your needs—for top performance on any portable drilling job—it pays to check Black & Decker *first!* That's because Black & Decker gives you an unmatched choice of Drill models. Capacities from ¼" to 1¼"—choice of handle arrangement for easiest operation—choice of speed, power and price in most capacities. And it's also because Black & Decker Drills give you powerful B&D-built motors—full ball-bearing construction—extra-tough gears, shafts and chuck spindles—husky housings, streamlined design, perfect balance.

Whether your problem is in production, maintenance or construction—whether it requires large or small drills—see your nearby B&D Distributor *first* for expert help. And write today for free, detailed catalog to: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

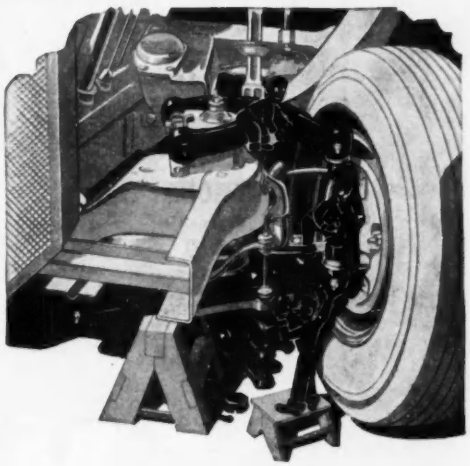
B&D Black & Decker PORTABLE ELECTRIC TOOLS

WORLD'S LARGEST, MOST COMPLETE LINE

For assembly-line or service-jack speed . . .

You can count on Thompson

Ball Joint Suspension

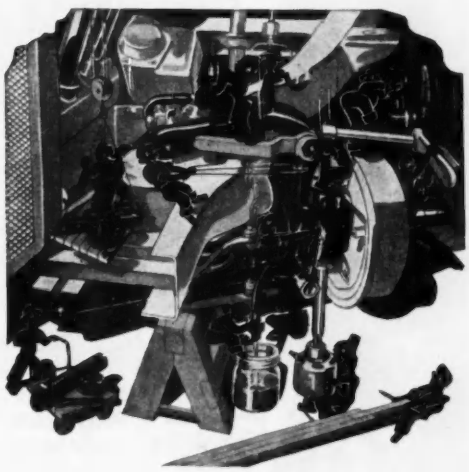


Only three simple operations are required to assemble or remove the compact service package from the suspension. Normal realignment of wheels is unnecessary.

THOMPSON'S new Ball Joint Suspension makes front suspension installation one of the fastest and simplest jobs on the assembly line. Its compact design and parts reduction cuts production from 12 to 3 operations. And the same "stop watch" speed carries over to the service jack. The equivalent of a complete rebushing job can be performed in half an hour.

In addition to high speed in assembly and service, Thompson's Ball Joint Suspension cuts lubrication; eliminates front suspension bind; gives extra under-the-hood space for wider engines. And in road life, steering and handling is easier, service prolonged.

Let the "STEERING ENGINEERS" at Thompson's Detroit Division help you solve your steering problems. Our research, experience and manufacturing facilities are always at the disposal of *all* automobile manufacturers. Call us at WA 1-5010.



Ball Joint Suspension eliminates nine of the operations shown above, including reaming and fitting of the king pin, disassembly of brakes and complete bleeding of the braking system.

Thompson Products, Inc.

DETROIT DIVISION

7881 Conant Avenue, Detroit, Michigan

BRISTOL
CONNECTICUT
2-9581
CHICAGO
MOHAWK
4-6622
PLYMOUTH
MICHIGAN
2310
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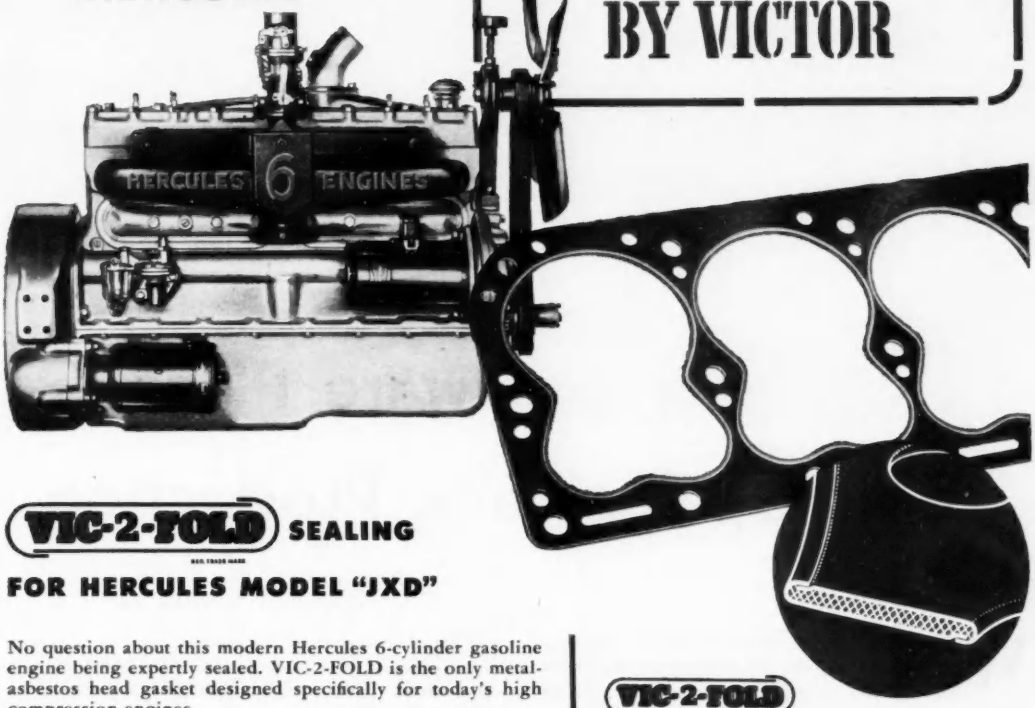

VIC-2-FOLD SEALING

FOR HERCULES MODEL "JXD"

No question about this modern Hercules 6-cylinder gasoline engine being expertly sealed. VIC-2-FOLD is the only metal-asbestos head gasket designed specifically for today's high compression engines.

VIC-2-FOLD is thin, yet compresses adequately for positive sealing. VIC-2-FOLD is strong and durable by skillful utilization of steel and copper as shown at right. VIC-2-FOLD sealing is equally effective on Valve-in-head or L-head engines, for truck, tractor, or car.

YOU'LL BE SATISFIED WITH VICTOR SERVICE

Wherever your design requires sealing with gaskets, shaft seals, or packings, you'll profit by calling in your Victor Field Engineer. You'll get full benefit of Victor's experience since 1909, and today's leading facilities for developing and manufacturing sealing products to your exact needs. Your inquiry invited; no obligation.

VIC-2-FOLD

THE THIN—YET COMPRESSIBLE METAL-ASBESTOS CONSTRUCTION

Compressible to 1/64" average on the engine, VIC-2-FOLD is the thinnest practical metal—encased asbestos gasket construction combining the high strength of steel and corrosion resistance of copper.

Note in the combustion openings how the bottom steel layer is formed up to overlap top copper layer for strong protection against breakdowns and blowouts.

Then note in the coolant openings how the top copper layer is formed down over the steel layer for high resistance to corrosion in contact with coolants and anti-freeze solutions.

Asbestos filler is of the finest long-fiber grade, precision milled and composed in Victor's own plant.

Where can we help you get better sealing?

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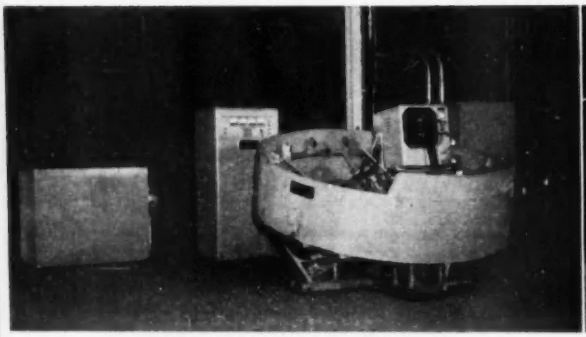
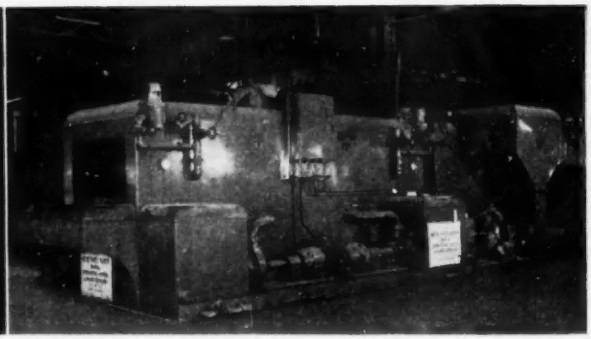


The ball races on the tank turret rings will be hardened on this Tocco induction hardening equipment.



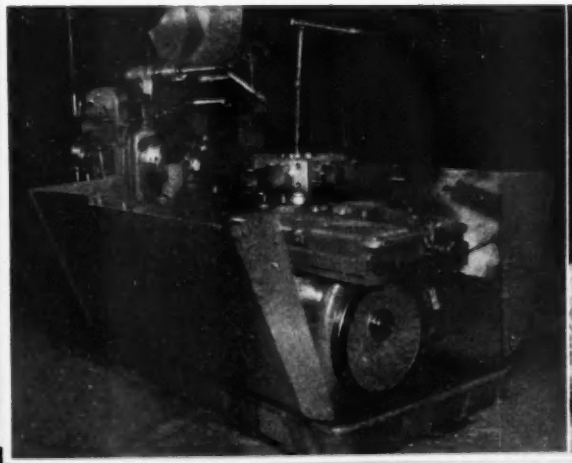
For the removal of foreign material from machined parts, Chrysler has installed an International industrial washing unit.

Chrysler-Delaware Plant Tools Up for Tank Production

WITH the need for the most modern fighting equipment to meet our defense quotas, many new facilities have been constructed. These plants have been supplied with some of the best and most up-to-date machinery available. An outstanding example is the Chrysler-Delaware Tank Plant at Newark, Del., which will shortly go into production on the Army's T-43 heavy tank and the T-48 medium tank—successor to the General Patton tank being used in Korea. A pilot model T-43 already has been built and currently is undergoing tests.

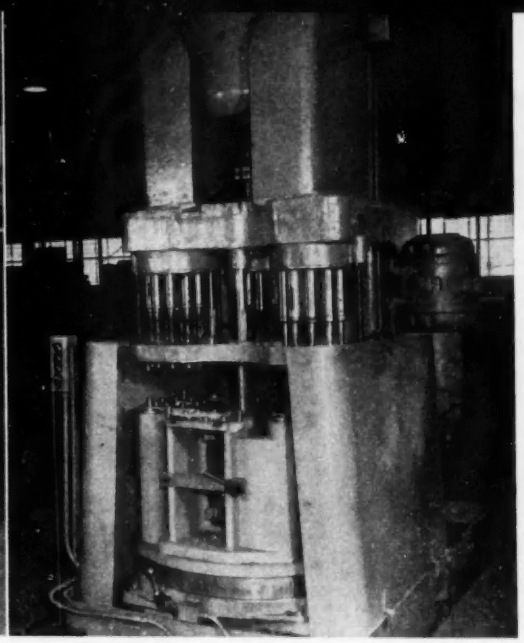
The task assigned to Chrysler at Newark has been described by Army Ordnance as "the most difficult problem ever given private industry and the most complete in the overall conception of any heavy armament production program." This multi-million dollar plant, described briefly in AUTOMOTIVE INDUSTRIES, December 15, 1951, is now going through the process of having its productive might established on the tank line. Currently, the Dearborn Machinery Movers are setting up millions of dollars worth of new machine tools and other machinery that will eventually forge another

Boring and facing operations on the final drive spacers will be done on Potter & Johnston automatic turret lathes.



This closeup of one of the Betts 120-in. vertical boring mills shows the machine in operation on a tank turret ring.

This Fellows 36 in. gear shaper will be used for cutting teeth in final drive gears.



Many special machines, such as this Michigan Drill Head Co., vertical spindle drilling machine, will be used in the plant. The Michigan unit will perform drilling, countersinking and reaming operations on final drive shafts.

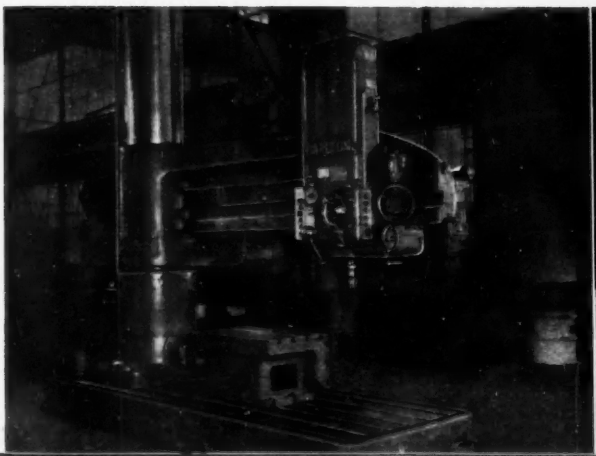
By Thomas Mac New

sizeable link in Chrysler's growing defense activities.

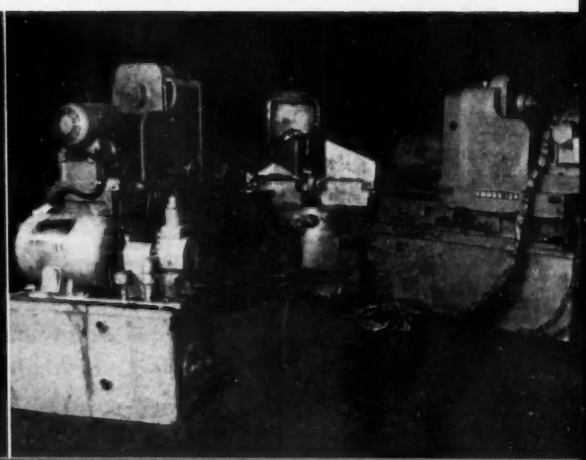
Just as rapidly as the machines are installed and placed in running order, they are staffed by tank plant employees to produce the vitally needed tank components. Besides complete tank assemblies the plant will fabricate torsion bars, turret rings, final drive shafts, suspension housing supports, final drive gears, final drive spacers, shock absorber brackets, and many miscellaneous small parts. Most of the machine tools already have been delivered and, in fact, Chrysler authorities claim that the machine tool builders did a wonderful job of rapid delivery.

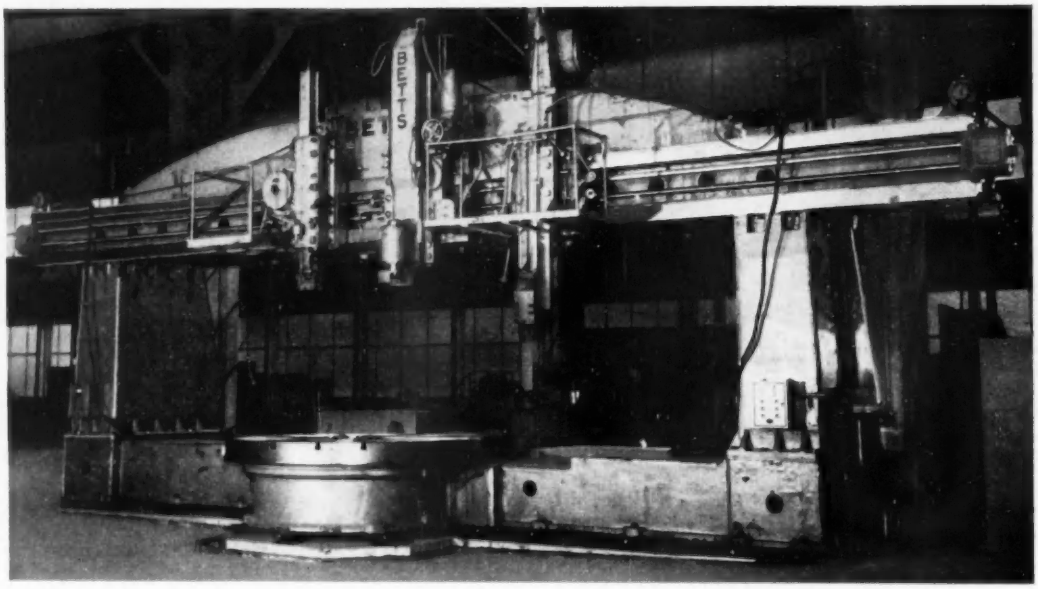
On the machine line, installed adjacent to the completely conveyorized hull and turret assembly line, is one of the largest machine tools utilized for tank output—a huge Consolidated Machine & Tool Co. Beets 29-ft vertical boring mill. This general purpose machine tool will be used for machining tank turrets and

Hugh Carlton radial arm drills will be employed for drilling, reaming and tapping holes in turrets.



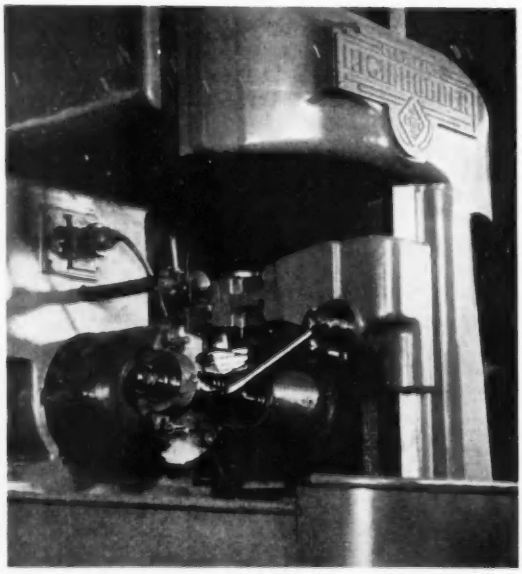
Seen here being installed is a special Cross three-way horizontal boring and facing machine with rotary index table.





About the largest single machine is this massive 29-ft Betts vertical boring mill. It will be mainly used for tank hull and turret operations.

hulls and will be used also for other components, where feasible. Several other Betts vertical boring mills, of the 120-in. type, already have been installed and placed in operation. A line of the machines is currently being used for boring and facing operations on the tank turret ring, as shown in the accompanying illustration, directly above.



Already in operation, this Cleveland Rigidhobber is being used for hobbing splines in final drive shafts.

The turret rings will have their ball races hardened on Tocco induction hardening equipment, built by Ohio Crankshaft Co. A special fixture on the Tocco unit will hold the ring as it rotates through the induction hardening head.

A battery of Carlton radial arm drills, with an eight-ft arm, 23-in. column, will be used for drilling, reaming and tapping operations on the tank turret. Although one of these machines was seen in operation, none have been installed permanently.

There are many machining details connected with the manufacture of the several final drive units. Four of the many machine tools that will be utilized for this production and are now in the plant, are a Fellows gear shaper, a Potter & Johnston lathe, a Cleveland Rigidhobber, and a Michigan Drill Head Co. multiple spindle drill.

The Fellows unit, a 36-in. type, will be used for cutting teeth in final drive gears; it has not yet been installed on the line. Boring and facing of the final drive spacers will be done on the Potter & Johnston automatic turret lathe. Splines in the final drive shafts are being hobbed on a Cleveland Rigidhobber; this machine is set up and in production, but operational details are not yet available. Final drive shafts will be drilled, countersunk, and reamed on the special vertical, multiple spindle drilling machine put

(*Turn to page* 118, *please*)

Testing Automotive Equipment Under Severe Arctic Conditions

By Leonard Westrate

This Article by the Detroit Editor of AUTOMOTIVE INDUSTRIES Was Written While He Was on a 30-Day Tour of Army Ordnance Operations Which Included Visits to Ordnance Facilities in the United States, Alaska, Japan and Korea.

BIG DELTA, ALASKA

IN the middle of thousands of acres of magnificent wilderness the Arctic Test Branch of the Army Field Forces is running a year-round proving ground for Ordnance combat and tactical vehicles and other military equipment under arctic and sub-arctic conditions.

Located at Big Delta, Alaska, about 105 miles southeast of Fairbanks, the ATB area is ideally situated from the standpoint of both terrain and climate for testing tanks and other vehicles. Temperatures range from −70 F to +90 F. Rapid temperature changes also are frequent, varying as much as 68 degrees within a few hours.

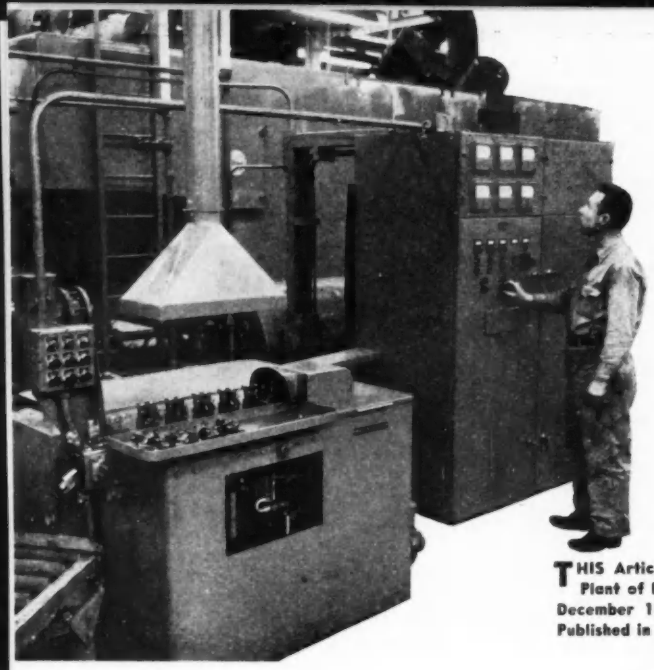
Several developments already are in use to combat the cold weather operation of vehicles in Alaska. A new subzero oil under test has a pour point of −50 F and a minimum flash point of 320 F. While still under test, the oil has been approved for all equipment that can use 10 W oil. Its effective range is from −50 F to 30 F above zero. Above that temperature, consumption increases. Under some conditions, the new oil has a tendency to excessive consumption, although this may be due to need for better engine conditioning as to rings and seals, since the trouble usually occurs with older engines. Special arctic lubricants also have been developed and are in use for transmission and differentials which will operate satisfactorily down to −65 F. A brake fluid has been developed which remains effective at temperatures ranging down to −80 F.

A new type battery also is in use having four to eight more plates per cell than normal batteries. It has greater ampere hour capacity at higher voltage.

An "Otter," built by Pontiac Motor Division of General Motors Corp., undergoes test at the Arctic Test Branch of the Army Field Forces.

Tests with fan belts have resulted in development of a new compound of rubber from which belts are made that will retain their flexibility at temperatures down to −65 F. Wear characteristics of the new fan belt

(*Turn to page* 98, *please*)



Special Making

Ends of the rocker arms are hardened in this conveyorized induction hardening machine supplied by Westinghouse. Rocker arms are loaded in fixtures on the small conveyor, transported through the induction heating station, then unloaded automatically.

THIS Article is the Third in a Series Devoted to the New Engine Plant of De Soto Division, Chrysler Corp. Part I Appeared in the December 15 Issue of AUTOMOTIVE INDUSTRIES and Part II was Published in the March 1 Issue. Quality Control will Form the Basis of Another Article Which Will Appear Soon.

THE new De Soto engine plant with its amazing vista of machine tool equipment — much of it unique and a "first" in this industry—is too big and too comprehensive for even a series of articles.

In an effort to provide some approach to a visualization of its scope, the present article is designed to touch upon a few selected operations on just a sampling of small parts.

In the water pump department, machining of the impeller is marked by an interesting single machine setup which combines operations usually handled on a number of individual machines. The job is done in the New Britain automatic illustrated here. It is an eight-station machine and does in one setting—boring of the large diameter, facing for the seal, boring the shaft hole, and milling the two wide slots for driving the seal assembly. Milling is done with a single cutter mounted on the tool slide which goes into action as the spindle at this station is stopped.

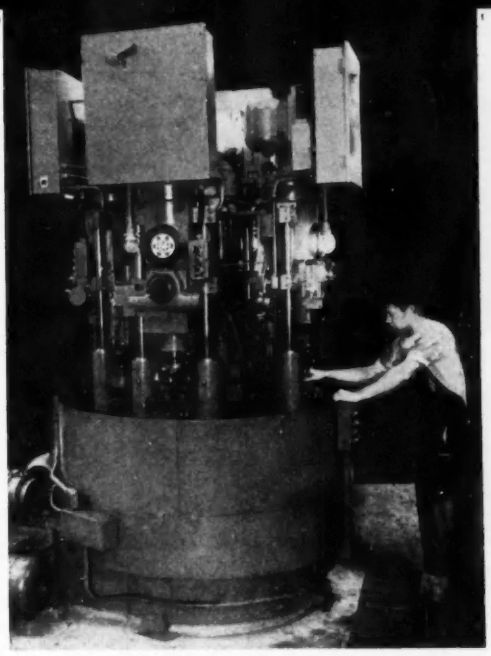
De Soto requires two rocker arms—a small one for intake, a larger one for the exhaust, both being of cast iron. Processing these parts involves the use of a number of special machines, some of which are entirely new for this type of operation. First major operation is the rough- and semi-finish boring of the large bore for the rocker shaft in the big Snyder trunnion-type machine and this is then used for locating in succeeding stages. As illustrated, it has six station positions, each one holding two parts, and working on ten pieces at a time since one station is reserved for loading.

The unique Davis Roto-Matic machine is designed to mill simultaneously the combination of two different radii on the valve stem pad end. The central trunnion fixture is made in two sections—one for milling intake rocker arms, the other side for exhaust rocker arms. This machine provided the solution to a rather awkward problem since the radii are in two different planes. In this setup there is a large milling cutter having a concave formation

This is the new Vinco gaging machine designed for checking cam contours. The chart recorder may be seen at the left. The entire set of cams is checked in only 4½ minutes.

Machines for SMALL PARTS

By Joseph Geschelin



The center bore in rocker arms is later honed to size in this four-station Micromatic Turret-Hone.

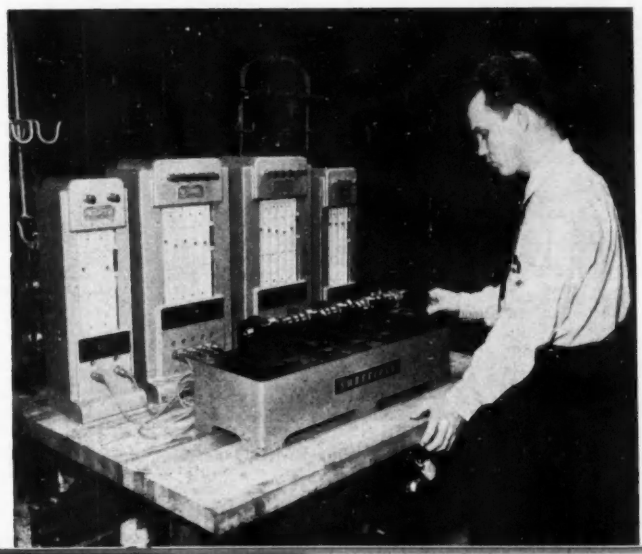
on the periphery to take care of one radius. The other radius is formed automatically as a result of mounting of the part on the radius of the trunnion.

Each rocker arm requires a number of fine oil holes drilled in various locations and angularity. This is done in a Kingsbury machine. The main problem with respect to this operation is some quick method of inspection to make sure that oil holes are all drilled and are clear. The solution for this inspection problem was found in the introduction of the Arlin air-inspection unit, pictured here. The operator simply pushes a part on the mandrel and the machine does the rest. If the oil holes are right, the work is automatically dropped down a chute to the tote box. If there is any defect, the machine will drop the part through one of two reject chutes. This operation, moreover, requires no extra labor since the machine operator does the job while tending the drilling unit.

At this point the large central bore is precision-bored in a three-spindle New Britain precision-boring machine. An outstanding feature of the machine is that the three spindles are magazine-fed by means of three magazines mounted immediately above the work-holding fixture.

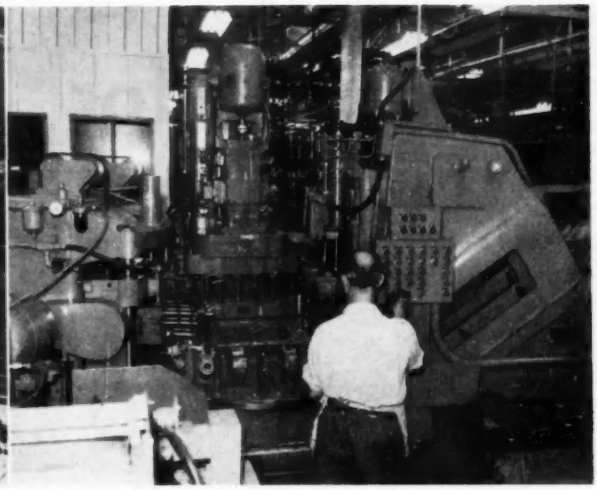
Now that initial machining has been completed, the parts are ready for hardening of the valve stem pad and push-rod ends. This is done in a Westinghouse continuous induction hardening unit, incorporating a power driven conveyor for holding the parts. Both ends are hardened at the same time. The machine is of low frequency type to prevent burning of the work.

Following hardening, the rocker arms proceed to several unique operations. First of these is the special Hoern & Dilts machine for polishing the spherical seat for the push rod end. It has five working stations with two spindles per



Sheffield Precionaire column-type air gages set up for inspection of camshafts. For this operation the camshaft is fitted in the master fixture seen in the foreground. Distributor drive gear fit is checked simultaneously at the right hand end of the fixture.

Three-spindle New Britain precision-boring machine is used for boring the hole in rocker arms. Attention is drawn particularly to the magazine feed for each of the three heads.



This is the unusual Kreuger special machine for milling oil grooves and drilling oil holes in rocker arm shafts. Groove milling is done at the station on the left.

station. The spindles, carrying the fine grinding tool are mounted at an angle so as to properly generate the spherical form.

Next is an unusual Ex-Cell-O machine designed to finish grind the double radius formation on the pad. Parts are mounted in a four-station rotating work-holding fixture while the wheel is cam-operated suitably to generate the desired form.

Final step is honing of the large bore in the four-station Micromatic turret honer.

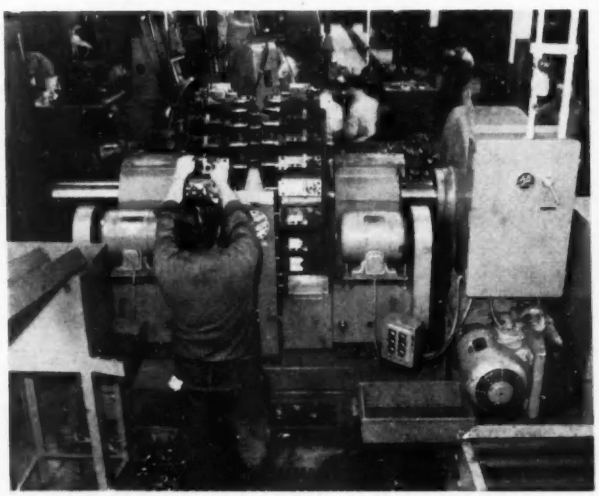
The parts now are given a Parko-Lubrite treatment in an automatic plating machine. And following this, the large bore is cleaned by wire-brushing in small special machines having a vertical spindle mounting for the brush, work being fed by magazine.

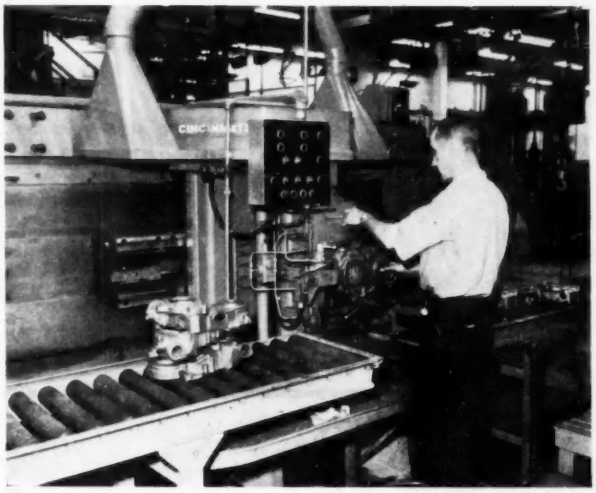
In a previous article we made reference to the ingenious setup for machining the chain case cover. Here is a rather complex cast iron part which includes the water pump housing as well. Moreover, the lower end of the housing is in the form of a semi-circle which must be machined exactly to size.

To start with, the two flat faces are milled in a rotary milling machine. Then the part is presented to the big Cincinnati surface broaching machine. As illustrated, this machine is fitted with a large sectional broaching tool of the proper concavity to produce the required radius. Broach sections are readily replaceable without disturbing the ram.

The next problem is that of handling the variety of milling, drilling, boring, chamfering, tapping, and reaming operations not only in all three planes but some in angular positions. Ordinarily this would require either a number of separate machine operations or a large pallet type transfer machine. After considerable study and consultation with the De Soto master mechanic's department, Greenlee produced a transfer machine in which work is moved progressively on the transfer conveyor, without resort to

Double-end, trunnion type Roto-Matic machine supplied by Davis & Thompson mills the compound radius on the valve stem pad of the rocker arms. This machine handles both intake and exhaust rocker arms.





Here is the big Cincinnati horizontal surface broaching machine for machining the half-round end of the chain case cover casting. A portion of the sectional broaching tool may be seen at the left.

pallets, and is automatically indexed twice within the machine cycle, producing operations in three planes. It has a total of 34 stations, with heads on both sides, and some angular heads. The machine contains a total of 94 spindles.

One of the interesting features of this equipment is found in the adoption of a series of tool boards supplied by Scully-Jones. These boards contain sets of tools for replacing those in the machine stations in the event of breakage or dulling. The tools and adjustable tool holders are preset by tool setting gages supplied by Scully-Jones, and are quickly replaceable.

The rocker shaft has many interesting operations, including grinding in a battery of the familiar Cincinnati Centerless grinders. However, one of the unique operations is found on the Kreuger-Barnes machine. As shown, the machine has a four-station, square indexing fixture and three working stations. At the first station, the unit mills four oil grooves in each shaft. To accomplish this, the cycle of the head is complex — first the head moves downward to a given depth of cut, then it moves outward to produce a groove of some considerable length at an angle with respect to the horizontal axis of the shaft. A series of oil holes is then drilled through the grooves at the second and third stations, the latter having spindles at a slight angle to the vertical.

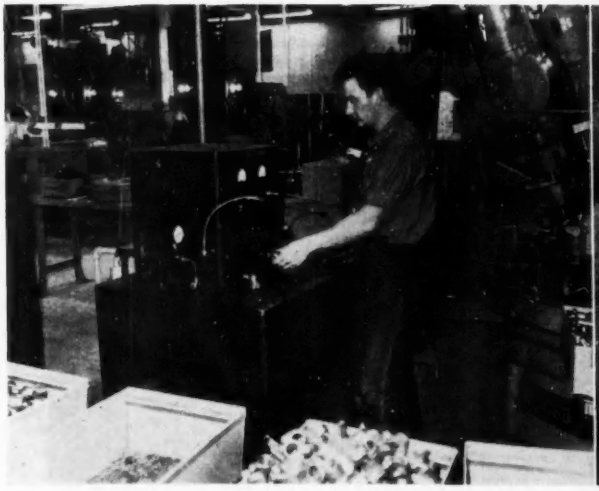
Experience has shown that these fine oil holes leave undesirable burrs on the inner diameter of the shaft. Deburring is done rapidly by shot blasting in an automatic American Wheelabrator.

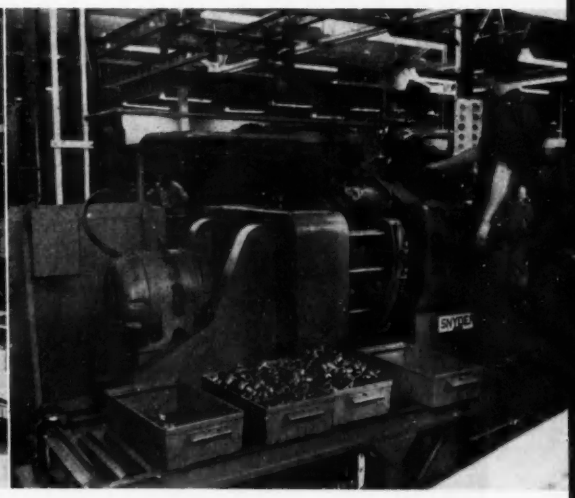
One of the neatest tricks on the camshaft line is the introduction of another "first"—a recording type Vinco camshaft inspection machine. As shown, the machine takes the entire camshaft and checks all of the significant dimensions and cam profiles on the entire series

(*Turn to page* 92, *please*)

One of the Arlin electronic inspection machines for verifying the drilling of oil holes in rocker arms. Drilling is done in the Kingsbury machine seen at the extreme right.

First operation on the rocker arm bore is done in this double-end, trunnion type Snyder machine. This handles the rough- and semi-finish bore on intake and exhaust rocker arms.





Sealing the

In this case a sealer is knife coated between the Plexiglas and aluminum fittings on the canopy. The material acts as a pressure and weather seal.

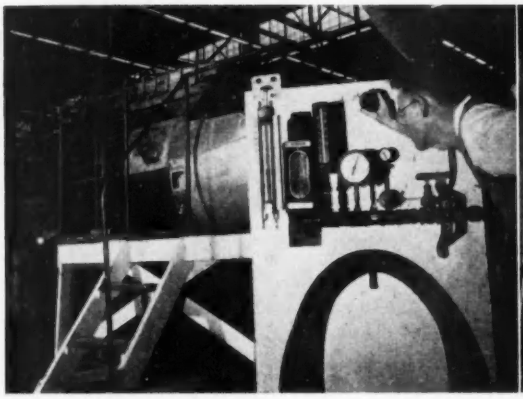
IN the fabrication of military aircraft, adhesives and sealers are playing an important role due to the pressures encountered at high speeds and altitudes. At the Farmingdale, N. Y., plant of the Republic Aircraft Corp., there are chiefly four sealers and two adhesives—manufactured by the Minnesota Mining and Manufacturing Co. —utilized in the construction of the F-84 Thunderjet fighter. This is just one example of how these products are used for such jobs as sealing rubber gaskets, bubble canopy assemblies, access doors, pressure bulkheads and cockpit superstructures.

For the installation of rubber gaskets under glass canopy access doors, Republic uses a black rubber-base adhesive that is fast-drying, flexible and water resistant. The material—EC 226—can be applied by brush, flow or spray methods.

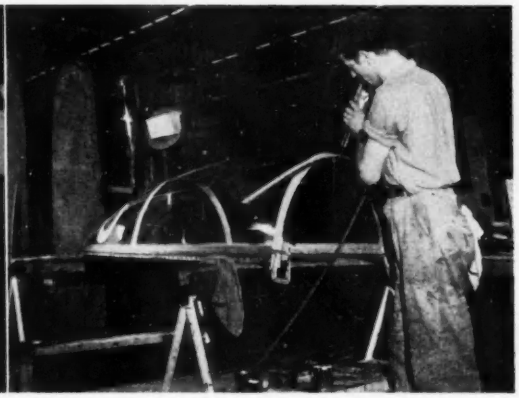
Another fast-drying adhesive that retains its bond at temperatures from −40 to +250 F is used for bedding and attaching inflatable seal tubes around windscreens. Known as EC 847, it is gasoline and oil resistant and can be applied by brush, knife, flow gun or other spreading equipment.

The sealing compound, EC 612, that is used on the access doors is said to be virtually unaffected by age, outdoor weathering, water, gasoline, oil or other chemicals and conditions. It remains permanently plastic.

Since the F-84's operating cabin pressures are maintained at 2¾ psi from 18,000 to 45,000 ft, this canopy seal test is made to insure that all openings have been securely sealed. Republic's test—using a fiberglass cockpit seal—permits 1.4 lb air flow per min at 5.6 in. of mercury to enter the cabin area.



One finishing touch in completing the F-84's canopy bubble assembly is to secure metal reinforcement bands around the Plexiglas. A sealing compound is used between the two parts.



THUNDERJET

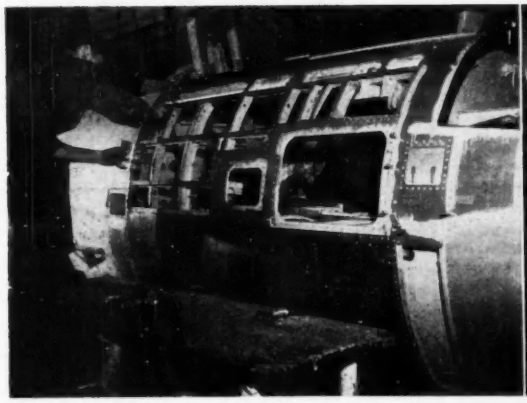
Sealers EC 1113 and EC 750 are being used to seal pressure bulkheads. In addition, all rivet holes and longeron exits are securely sealed at this stage.

For bulkheads, rivet holes and longeron exits, a sealing material has been designed to seal seams against internal pressure loss during high-speed high-altitude flight. Properties of the material—EC 750—include resistance to weathering, water, oil and fuel.

A sealer with a tensile strength, when fully cured, in excess of 500 psi and that does not deteriorate when exposed to alcoholic anti-icing fluids is employed for pressure and weather seals on bubble canopy assemblies. This same sealer, EC 801, is used as a sealing and bedding compound between the canopy bow strips and Plexiglas. It is generally applied as a fillet along the pressure side of seams and around any openings leading to the exterior, which must be sealed to maintain cabin pressure.

The last compound, EC 1113, to be considered here was formulated specifically for aircraft pressure cabin sealing. It maintains a weather-tight, cold shock resistant seal which prevents water splash from the landing gear, slipstream and other sources from entering the fuselage. Republic uses the material for under-sealing outside aluminum skin, sealing the aft section of the radio compartment, and sealing cockpit suprestructures prior to installation of the outside aluminum skin. Brushing is the most common method of application.

A sealer is used on the cockpit superstructure during fabrication; it seals between the structural ribs and the outside aluminum skin of the plane to prevent leaks.



For sealing access door areas, 3M sealer EC 612 is used. Material is packed into the gaps between the stringers and aluminum outer skin. The compound remains permanently plastic.

New ASTE officers. From left to right, front: G. A. Rogers, asst. secy-treas.; R. F. Waindle, 1st vice-president; L. B. Bellamy, president; J. P. Crosby, 2nd vice-president; H. E. Collins, secretary; Dr. H. B. Osborn, Jr., 3rd vice-president. Rear: H. E. Conrad, executive secretary. (H. C. McMillen, reelected treasurer, not shown).

ASTE 1952 Outdoes

By H. H.

WITH the decline in percentage of skilled workers available, industry must utilize the most efficient machines, tools, inspection devices, and materials handling equipment to build up defense production capacity while maintaining our civilian economy.

Because of these conditions with which industry is faced, the 1952 Industrial Exposition and the simultaneous 20th Annual Convention of the American Society of Tool Engineers at Chicago March 17-21 were of outstanding importance.

The huge Industrial Exposition, occupying all available space in the five halls of the International Amphitheatre, featured over 400 exhibits, more than 100 of which were devoted to machine tools. Production equipment from England, France, Belgium, and Switzerland was more in evidence than at any similar event. The total number of exhibitors exceeded the former record-breaking number at the 1950 Exposition in Philadelphia.

Attendance and registrations went far beyond expectations with total registrations exceeding 35,000.

Quality control is of such importance that an entire hall in the Industrial Exposition was devoted to exhibits of this type, and all technical sessions on March 17 were on the subject of "Precision Control."

A fire swept the South Hall of the Amphitheatre during the evening of March 18 and destroyed 14 exhibits, all of which reopened by the 20th. Among the exhibits destroyed were

Observations on FOREIGN MACHINE TOOLS

By Joseph Geschelin

THE ASTE Exposition held in Chicago last month became a perfect spring board for foreign machine tools. This equipment in profusion from Germany, France, Belgium, England, and Switzerland dominated the first floor exhibit area of the Stockyards Amphitheater.

The influx of foreign machinery poses some serious anomalies. In the first place, ECA funds, our tax monies, were poured into many of these countries to encourage production of machine tools as a means of supporting the economies of friendly nations. As it turns out, however, all of these countries — with the possible exception of Switzerland—need hard currency and the only way they can earn it is by exports. Consequently, the major proportion of all machine tools must be exported. And the only place that can give them dollars is the U.S.A.

Thus, instead of expanding foreign manufacturing facilities through ECA funds, we are faced with the fact that the products are being shipped to the U.S.A. to compete with our own machine tool industry.

Moreover, while our own domestic machine tool industry is being operated under strict Government controls through NPA, and cannot serve civilian requirements at all, foreign machine tools are permitted free entry and can be sold to anyone for any purpose.

Opinion was unanimous that the foreign machinery looked good to the eye. It was well styled, clean of lines, and in many instances, beautifully finished. Whether or not these machines invariably have the quality and durability of our own products remains a question to be settled only by operating experience.

In the opinion of many factory observers, the major advantages possessed by foreign markets are those of availability, i.e., quick delivery, and lower prices. On that basis alone there should be a quick boom in foreign machines.

There is a slight hitch that might be taken into account. While certain items are of heavy duty design, a large propor-

Meeting Former Events

Roberts

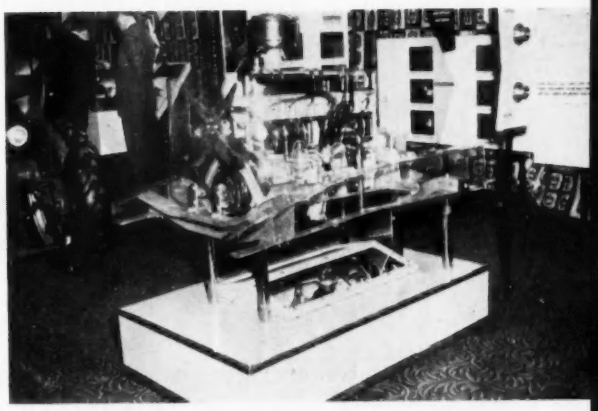


Exhibit of the International Harvester Co. which featured quality control methods. While IHC is not a supplier of precision control equipment, it took this space to show tool engineers what can be accomplished with effective quality control systems. This was one of the 14 exhibits damaged by fire.

those of the Taft-Pierce Mfg. Co. of Woonsocket, R. I., which estimated its loss at $200,000, and Eastman Kodak Co. of Rochester, N. Y. Eastman estimated its loss at $60,000.

There were 45 technical sessions starting Monday morning and continuing through until Friday evening — perhaps the most extensive and comprehensive group of technical sessions ever devoted in one week to manufacturing problems and equipment. Daily panel sessions supplemented individual papers and discussions.

Following are abstracts of some of the papers presented during the technical sessions:

Trepanning and Drilling with Carbide Tools

The production of accurate deep holes from the solid in various materials by either the gun drilling or the trepanning method is an extremely interesting operation because the care used in setting up any given job is quickly reflected in an increased number of linear inches of hole produced. Both methods have been in use many years. However, the trepanning operation, according to Fred W. Lucht, Development Engineer, Carboloy Department of General Electric Co., Detroit, is about 10 times as fast as drilling the hole with a conventional spade drill, even when the diameter of the hole is only two in. For larger diameters, the advantage increases even further.

(*Turn to page* 106, *please*)

tion of foreign machines, particularly those produced in Belgium, are relatively light universal types having but limited applications. In general, such equipment is suitable only for very light job lot manufacturing and for tool room use.

Leafing through catalog data we found that many lathes and milling machines, for example, were designed for use with 2, 3½, 5 and 7 hp motors. Certainly this falls far short of requirements for automotive metal cutting and is decidedly not adaptable for chip removal with cemented-carbides. We were told that in at least one instance where such equipment was ordered, the customer specified machines two to three sizes larger than the job required from the standpoint of table size, in order to get a heavier machine with adequate power drive. It is obvious that this procedure does not select the lowest priced machines and it is quite probable that the price is quite comparable to a domestic machine, if one were available.

Undoubtedly, there is a place for foreign machine tools at the present time considering that so many manufacturers are desperately in need of equipment for tool rooms and odd manufacturing jobs. However, few of these machines can be of value to automotive producers. They are light and underpowered and could hardly find a place on repetitive operations.

It may be of interest to mention how the Belgian representative explained the situation with respect to the size of electric motors. It appears that electric power in most European countries is as much at a premium as is motor car fuel. Because of the shortage in power, they are forced to get by with the smallest sized motors that will do the job. But they use them most effectively and efficiently.

This implies that foreign machine tools are just as limited in their ability to handle American manufacturing requirements as are foreign cars in relation to our driving requirements.

It seems apparent that so long as our own machine tool industry is hampered by NPA regulation, there will be a market for foreign machinery to fill tool-room needs and for light manufacturing. On the other hand, an influx of general purpose tools at this time and for some time to come is bound to reflect on domestic tool sales whenever the defense program begins to lag.

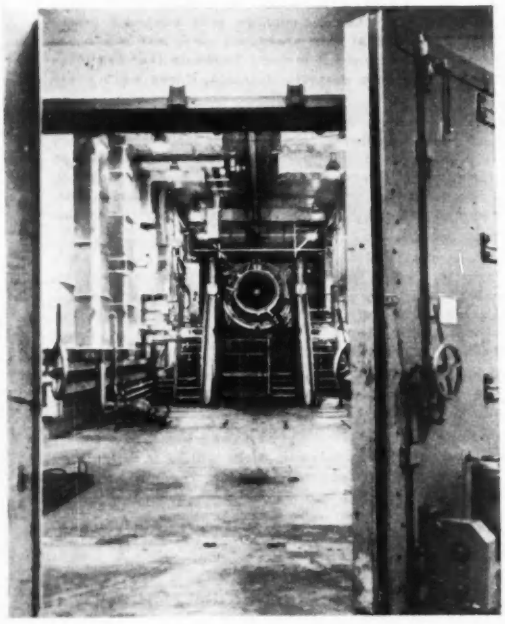
10,145 JET ENGINES

General Electric Discloses Production Accomplishments During Anniversary Celebration of "The Fastest Ten Years in History," and Dedicates New Lockland Jet Engine Plant.

By Thomas Mac New

To commemorate its 10th anniversary—"The Fastest Ten Years in History"—in the field of jet engine design, development and manufacture, the General Electric Co. held ceremonies last month at which a new production jet engine—the J47-GE-27—was announced and the Lockland, Ohio, jet engine plant was dedicated. From the time the original I-A jet ran for the first time on March 18, 1942, the company has brought about almost a five-fold increase in the thrust rating of production engines. As compared with the approximate 1200 lb rating of the I-A, the J47-GE-27 has a thrust in excess of 5800 lb.

Super-test cells, for developmental turbojets, are capable of housing jet engines far more powerful than any now in production.



Since the inception of the production program at the firm's Lynn, Mass., plant a decade ago, GE has delivered 10,145 jet engines—up to March 19, 1952—to the Air Force. A company official stated that the next 10,000 engines will be produced in a fraction of the time taken for the first 10,000. Included in the engines manufactured during the past 10 years are the I-A, I-16, J-33, J-35, and J-47.

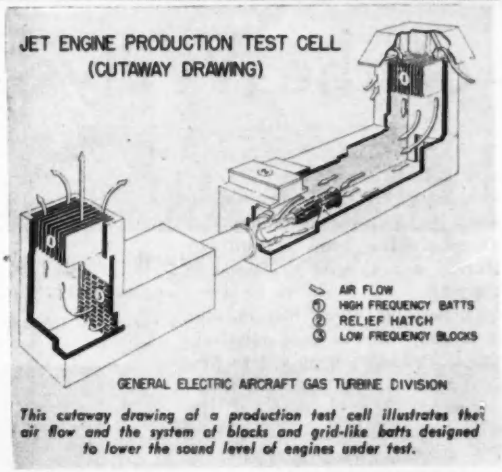
When finally completed, the Lockland plant, located on the outskirts of Cincinnati, will encompass nearly 3,800,000 sq ft of floor space. It will include facilities for engine development, parts production, assembly, test, and administration. Currently the plant has many machine tools set up and in production on various jet components. In planning the manufacture of parts, the company, working in conjunction with American tool builders, has made every effort to make high precision compatible with quantity production.

New facilities at Lockland are intended to provide a portion of the parts for engines assembled at the new plant, and to supply parts for new and developmental engines. A large percentage of the parts for Lockland-built engines will continue to be provided by other manufacturers throughout the country. Prior to the official opening of the plant, Ralph J. Cordiner, president of G-E, stated that the company has over 4000 subcontractors and suppliers for the J-47 program.

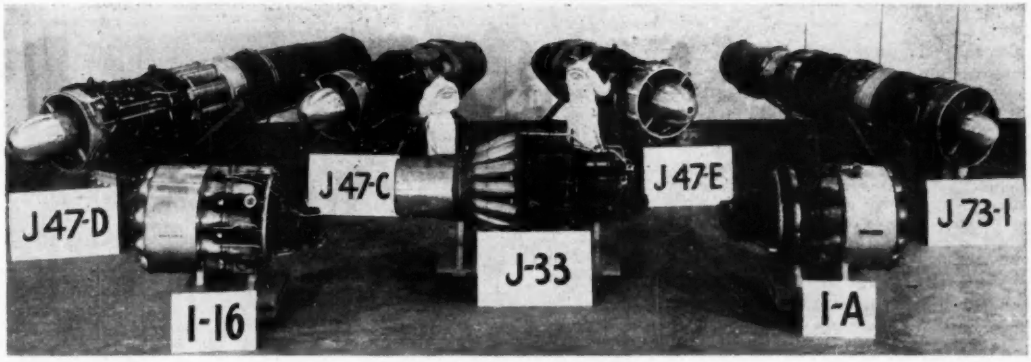
Instruments located in this control room, which is suspended on a cushion of rubber, record every phase of a turbojet engine's performance under test. This control room is used along with special test cells for experimental jet engines.

One of the outstanding features of the plant is the modern testing facilities which have been established. Each production engine test cell has been designed with a system of blocks and grid-like batts to lower the sound level of engines under test. Reduction of sound below the normal level was stated to be 50 per cent. The cells are

(*Turn to page* 102, *please*)

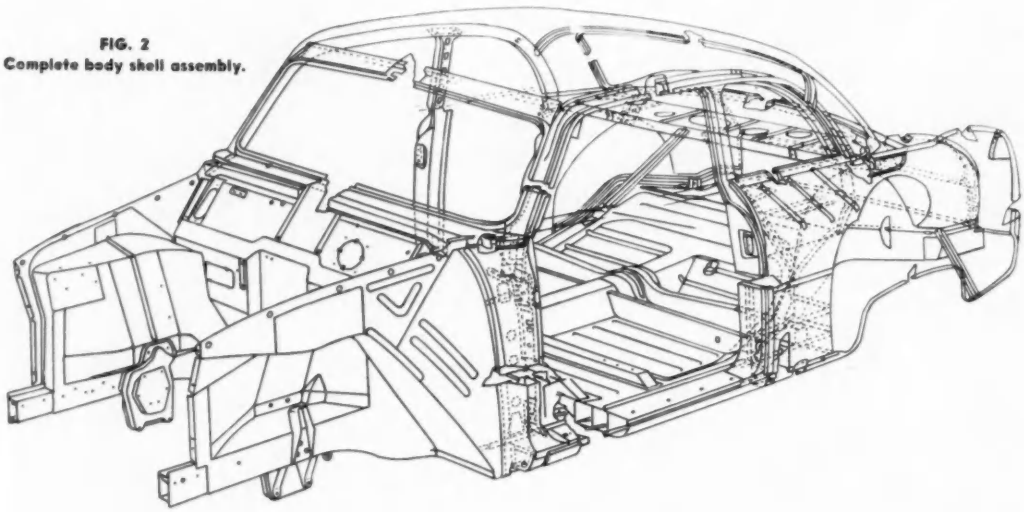


This cutaway drawing of a production test cell illustrates the air flow and the system of blocks and grid-like batts designed to lower the sound level of engines under test.



These seven aircraft turbojets, all developed by the General Electric Co. for the Air Force, graphically show the evolution in size and design from the first engine built—the I-A—to the latest—the J-73.

FIG. 2
Complete body shell assembly.



Construction of the Willys-Overland Body

FEATURING an advanced form of integral body and chassis frame construction, the body for the Willys-Overland car represents a joint development by W-O engineers and the Murray Corp. of America. The body is built by Murray and shipped to Toledo in the white.

Cooperative effort has resulted in a body composed of relatively simple elements, combined to produce a strong and torsionally rigid structure. The backbone of the Willys body is the sub-assembly—Fig. 1—shown in perspective. It consists of the floor panel or underbody sub-assembly; the forward side rail members which telescope into the underbody framing; the lower back panel at the extreme rear; the inner and outer wheelhouse panels at the front; and the sub-assembly of the toe-board and dash panels.

Most of the welded joints are made with the usual overhead-mounted portable spot welders, arc-welding at certain points being handled in ventilated booths. An important feature of all welding assembly operations is the use of suitable spot sealers designed to seal all joints effectively, including the joint between the side rail and underbody.

Before reaching the stage of sub-assembly men-

This is the massive master framing fixture in which the body shell is integrated by spot welding.

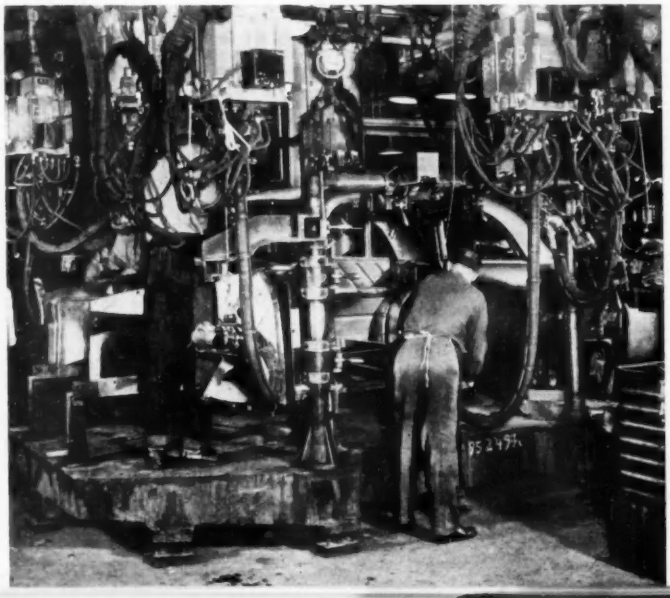
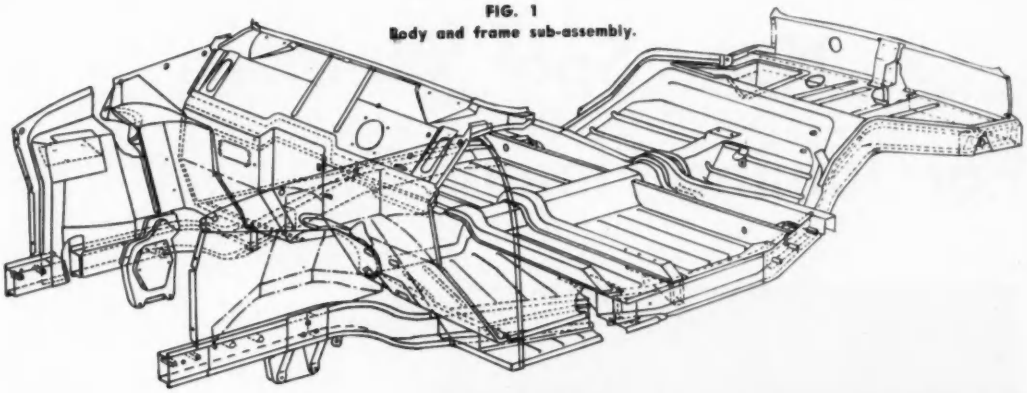


FIG. 1
Body and frame sub-assembly.



By Joseph Geschelin

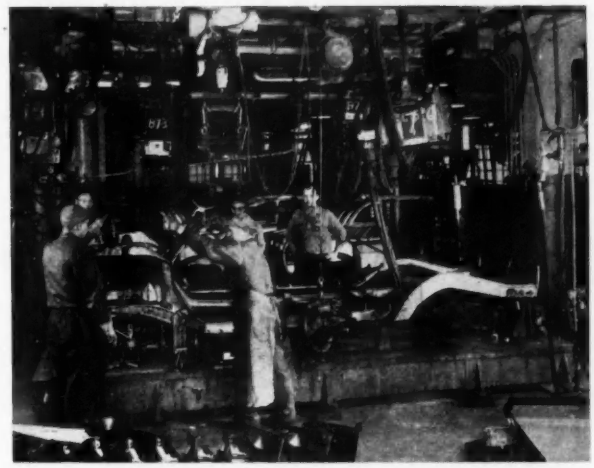
and Frame

tioned above, the individual sub-assemblies are prepared at various points. The underbody, as usual, is made in two sections — front and rear — welded together. A distinguishing feature here is the fact that the heavy box-section side rail framing is joined to the underbody as the final operation, as illustrated.

The right- and left-hand body side panels, which incorporate the integral rear fender, are prepared as sub-assemblies in three stages on separate parallel lines.

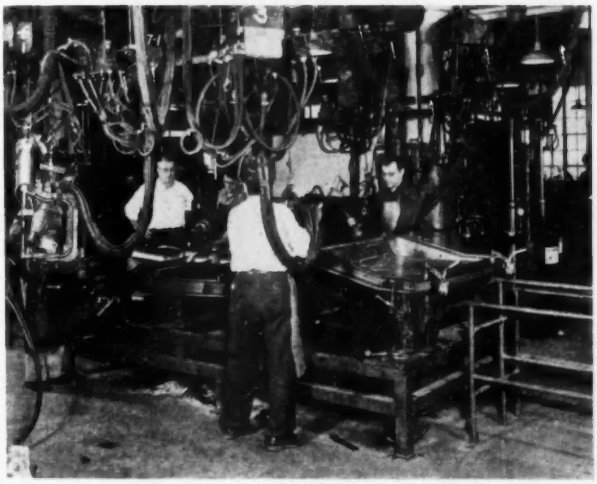
Returning to Fig. 1, attention is drawn to the fact that outer wheelhouse panels are welded to the outer face of the forward side rail while the inner panels are welded to the inner face of the rail. This results in the development of a deep double-wheelhouse structure embodying the load-carrying ability required for housing the front end suspension. Front suspension, incidentally, is mounted on the thick-section stamped hangers seen at the front end. These hangers are securely arc-welded to the inner panel before assembly to the front end.

(*Turn to page* 87, *please*)



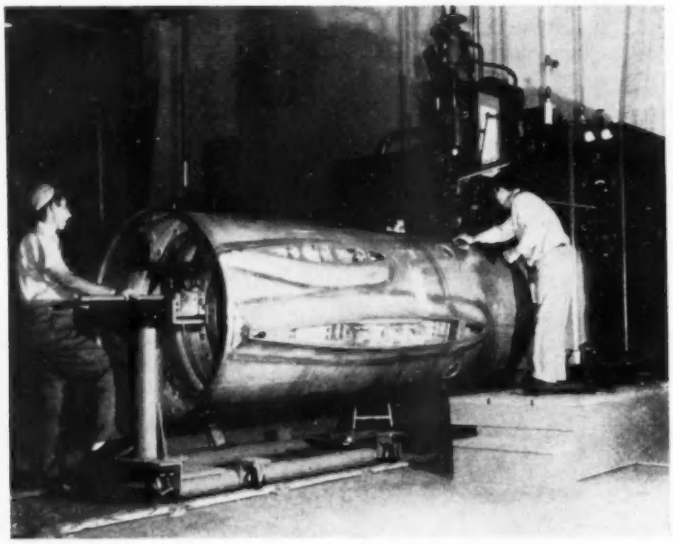
Here is a view of the weldinog of the backbone of the Willys-Overland body. In this fixture the operators weld the inner and outer wheelhouse panels and other parts to the underbody.

Welding of the box-section side rails to the underbody completes the operations on the underbody section.



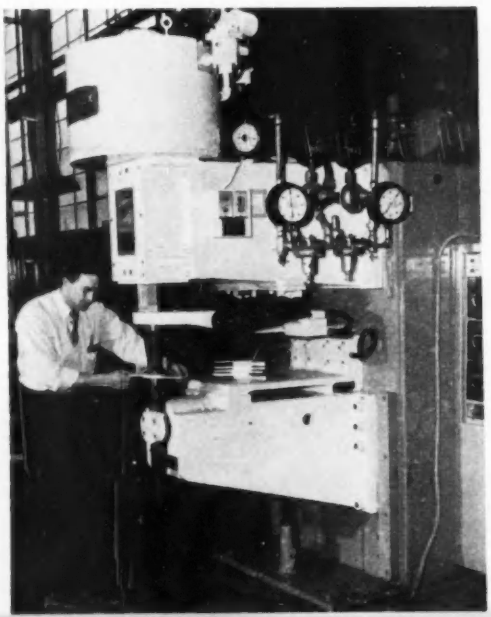
Huge Spot Welders For Joining Heavy Gage Metals

at Ryan and Republic Plants



Left — Shown here is one of the eight Federal seam welding machines employed by Ryan on external fuel tanks for aircraft. These tanks are said to be the largest ever designed.

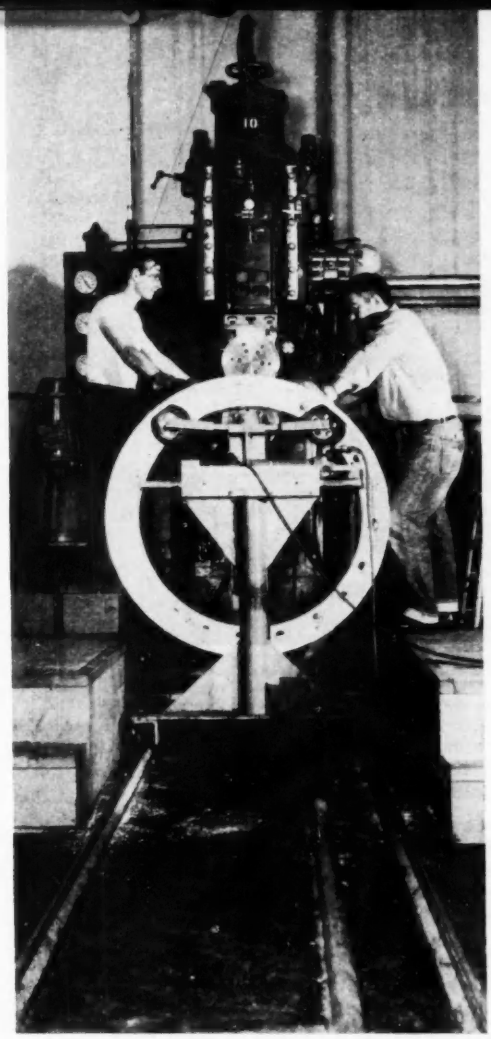
Below—Huge Sciaky spot welder at Republic Aviation Corp. The operator is shown making a spot weld specimen to test the strength of the weld.



MODERN spot welding equipment is now engineered to fabricate primary, load-carrying aircraft structures and heavy-gage metals of practically every kind. This fast, clean method adds no weight to the design. It leaves aircraft surfaces smooth with no protuberances to affect aerodynamic efficiency.

A pioneer in the use of spot welding techniques, Ryan Aeronautical Co., San Diego, Calif., has the most modern and complete resistance welding equipment available. New machines in the company's plant can stitch together two sheets of ¼ in. thick steel or two sheets of aluminum alloy ⅛ in. thick.

An example of the type of product which is now possible with present spot welding "know-how" is the huge external wing fuel tank which Ryan is building in quantity. Largest of their type ever produced, these torpedo-like containers depend upon spot welding for their light-weight design and aerodynamic smoothness. They are fabricated with



Left—Large tank sections at Ryan are brought to the seam welding machines on dollies and tracks. Overhead monorail conveyors lift the sections on the dollies which have integral hydraulic cylinders to swing them for welding across tapered surfaces.

seam welded joints in which rotating electrodes produce a series of overlapping spot welds to form gas-tight seams without the need for sealing compounds.

Not long ago, spot welding would scarcely have been considered for building such primary structures as floor beams for cargo aircraft. Today, Ryan is making complete sets of 49 floor beams for each Boeing C-97 Stratofreighter. Each I-beam assembly has 1000 spot welds.

In the jet engine field, Ryan uses spot welding to form combustion chambers and transition liners of Inconel and cone and tail-pipe assemblies of stainless steel. The stainless steels and nickel base alloys are well fitted for spot weld design because their high electrical resistance makes short heating time possible.

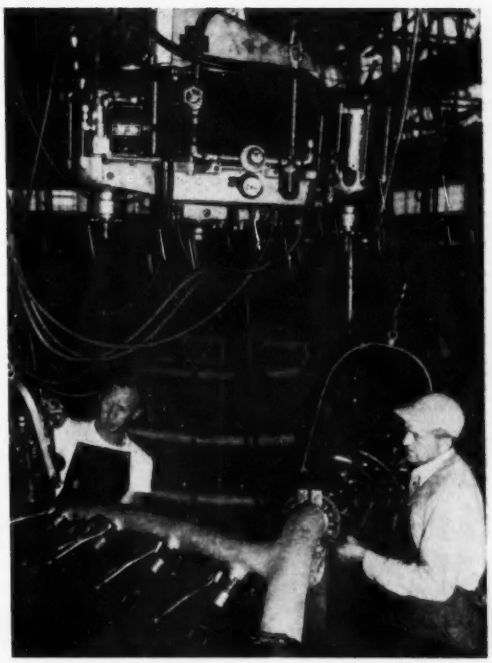
At Republic Aviation Corp., Farmingdale, Long Island, N. Y., the world's largest known spot welder is joining high-strength aluminum alloy combinations up to ¼ in.-½ in. thicknesses, and is averaging more than 80 spot welds per minute on wing skins. On internal structures, not subject to aerodynamic stresses, Republic has welded up to 100 spots a minute.

The big three-phase frequency converter spot welder, built by Sciaky Bros., Inc., was brought to its present high effectiveness by refinements suggested by Republic and jointly developed by Republic and Sciaky.

A feature of the refinement was installation of bigger and better air regulators and pressure gages, thus making possible finer control of pressure. Other improvements in technique were developed by Republic personnel.

According to current plans, spot welding will be extensively employed in the forthcoming Republic F-84F, swept-wing fighter-bomber.

Below—Twin spot welding guns are used on the production lines at Ryan Aeronautical Co. for Pratt & Whitney reciprocating engine exhaust systems. Suspended from spring-loaded reels carried on overhead monorails, the guns can be mover up and down the assembly lines.



A special arrangement of trailer tailgates permits this 6000 lb capacity low lift truck to unload skid boxes containing small castings from both trailers without hitching.

As skids are unloaded and placed on the dock, a high-lift platform truck tiers them two high and transports them to production or storage areas. The fork truck in the background is returning empty skid boxes to the dock area.

Economical Handling of Small Castings

for Engines

AN interesting example of the high degree of mechanization that can be attained in handling a large volume of small castings is illustrated by operations at a large mid-west engine assembly plant. Although both the volume and variety of castings involved in this case are quite extensive, many of the basic handling operations apply to other firms both large and small.

Originally small castings such as manifolds, pistons, etc., were dumped on the floor of railroad cars at the foundry with little thought to separation of the various classes of parts in the shipment. Upon arrival at the assembly plant, the parts had to be sorted, counted and manually loaded into four wheeled push carts for movement to storage. Since approximately 700 tons of material were handled daily, a huge labor force was required, counts were inaccurate, and because of loose shipment, freight rates were high. Rising costs and labor shortages eventually reached the point where some action was needed to reduce cost of this operation

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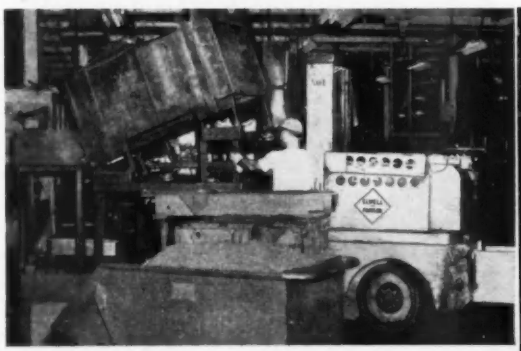
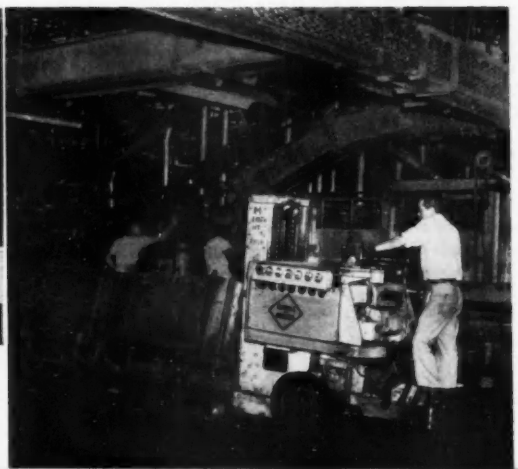
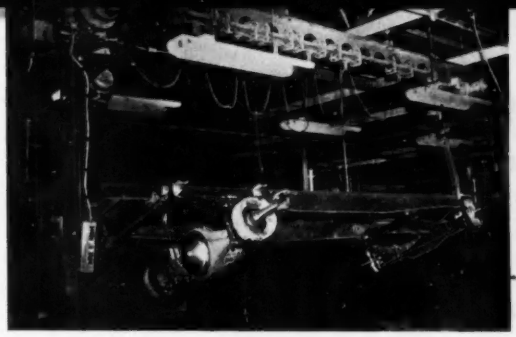
A skid box with a swing-up end door is located on a tilting rack next for a vertical milling machine. Gravity flow onto the adjacent table places the castings within easy reach of the machine operator. The platform truck is used to raise one end of the skid which is then held in place by a bar shown being inserted by the truck operator.

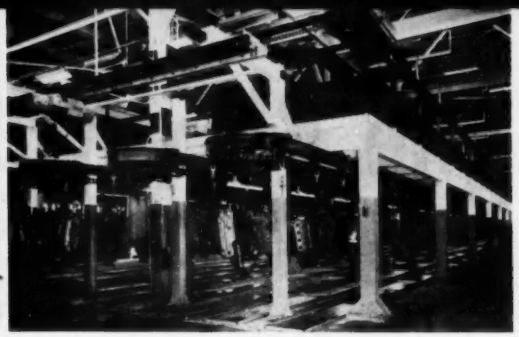


Skid boxes are placed on this specially designed rack which tilts them, placing all castings in the box within easy reach of the men loading the overhead conveyor.





Frame turnover hoist in operation after front and rear axle assembly has been made.



Handling engines from receiving through storage to the assembly line.

Proper Lubrication Vital on Truck Assembly Lines

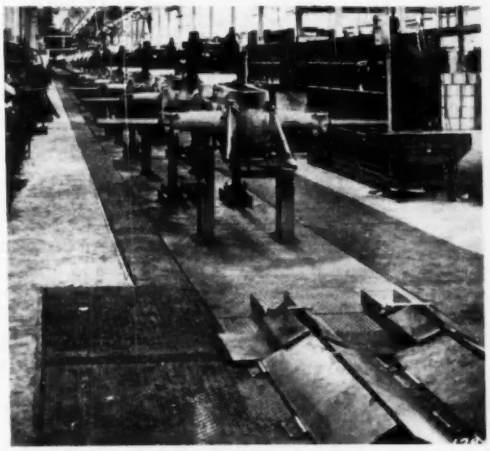
THE type of machinery used in line production of heavy-duty vehicles is of particular interest in respect to its lubrication. All parts must function in a coordinated manner, otherwise slowdown may develop. Faulty lubrication can cause malfunctioning, to thereby result in this slowdown. But more important, failure of any part due to continued faulty lubrication can cause production stoppage.

Electric motors drive the conveying machinery and speed reducing units which are required to move the vehicle frame from its start on the line till it rolls off under its own power—a finished vehicle.

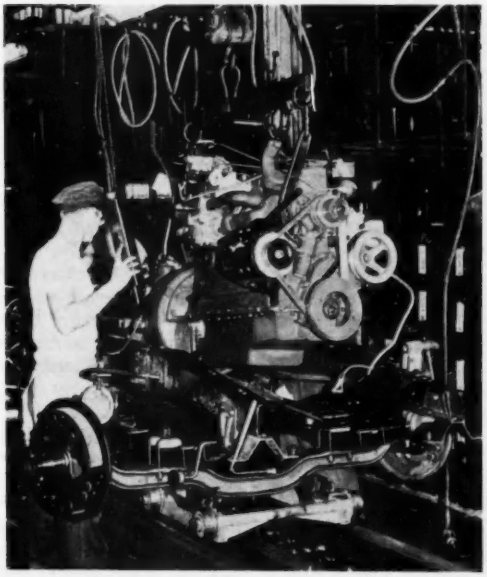
Air power is often used to operate the overhead hoists and pneumatic tools required for handling and fitting together of the parts. These basic machines along with the conveyor chain itself, the gears which reduce the speed from the power transmission unit and the lift trucks which dart around the plant under their own power, constitute the machinery on the assembly

(*Turn to page* 88, *please*)

Starting point of a heavy duty travelling platform conveyor. The chain and flange wheels on this unit must be carefully lubricated to carry the prevailing loads.



Engine mount on a box-type conveyor, featuring the industrial rail and dollies for support of the front and rear axle assemblies.



The BUSINESS PULSE

Number of Workers Employed During Winter Months Considerably Higher Than a Year Ago. Future of the Wage Stabilization Program Has Been Brought Into Question by Steel-Wage Dispute. Import-Export Trade Gap Narrowing.

Increasing Price Stability

There appears to have been little change in the aggregate level of business in recent weeks. A slight preponderance of deflationary pressure is still indicated, arising mainly from the continuing tendency on the part of consumers to save more than the usual portion of their disposable income. Strong offsetting factors which are eventually expected to overbalance the softness in consumers' goods are present in rising defense expenditures and a very high rate of business investment. For the time being, however, prices continue their slight downward drift, but with some indications of increasing stability. Despite cutbacks in some important segments of the economy caused by shortages of materials and lagging demand, business activity as a whole remains at very high levels.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

A key factor underlying recent tendencies appears to have been the adjustment of inventory positions. A leveling off of commodity stocks has been going on for a number of months, and official figures show that by January of this year the building up of inventories had practically ceased. This is in sharp contrast to the situation a year ago, when manufacturers and dealers were adding heavily to their stocks. Inventories in defense industries have continued to rise, but those in some consumers' goods industries have been reduced.

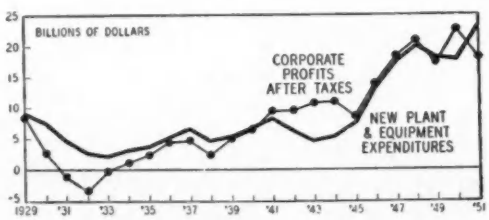
The supply situation for many basic materials has shown definite improvement in the last several months, and a relaxation of certain Governmental controls is indicated. Already private trading in rubber has been resumed, and metal allocations for the second quarter of the year have been liberalized. As a result of these developments, expectations for private construction, automobile production, and other industries producing consumer durables have become considerably more optimistic.

Unemployment, which is still regarded as a serious problem in some localities such as Detroit, has not been large enough to affect the over-all total appreciably. Official estimates show that the number of workers employed during the winter months has been seasonally lower than in the summer and fall but considerably higher than a year ago. Non-agricultural employment registered a contra-seasonal advance from January to February to set a record for the latter month.

Billion Dollar Steel Cost Increase

The recommendations of the Wage Stabilization Board in the steel-wage dispute touched off a controversy of far-reaching implications. The public members of the board estimated that the recommended increases would raise wages by 18.8 cents an hour for 1952 alone, with further increases to become effective next year.

Steel-industry spokesmen estimated that the recommended advance in rates would add 30 cents an hour to the individual wage bill and that the resulting increases in costs of raw materials would mean an additional 30 cents. Altogether, they calculated, the cost of making steel would increase by a billion dollars annually. The industry members of the board declared that "it is absurd that the largest increases in history should be recommended in a dispute case during a period of wage stabilization."

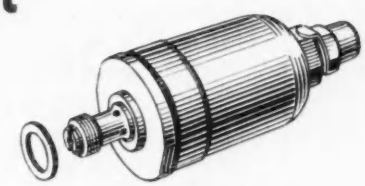


Corporate profits and capital outlays of businesses are correlated as shown by this chart prepared by the National Industrial Conference Board. Expenditures on new plants and equipment in 1951 were well above their postwar relation to corporate net earnings. Higher taxes paid by companies last year were responsible in a big way for the lower net earnings in 1951.

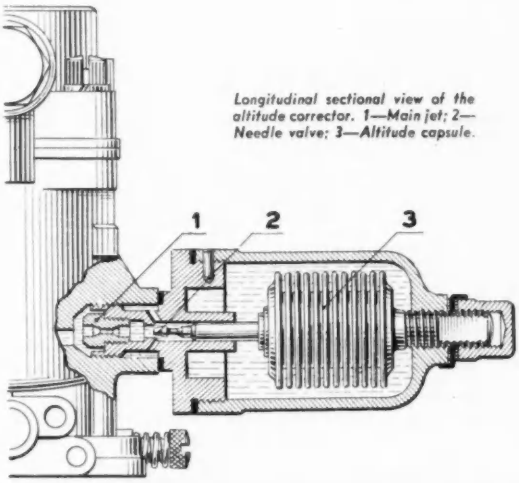
Defense Mobilizer Charles E. Wilson observed that the recommendations, if effected, "would be a serious threat to our year-old effort to stabilize the economy." After union officials had intimated that they might

(*Turn to page* 116, *please*)

New Carburetor Attachment Compensates for Altitude



Solex altitude corrector.



Longitudinal sectional view of the altitude corrector. 1—Main jet; 2—Needle valve; 3—Altitude capsule.

AN altitude corrector of the same general type as used in aviation has been produced by the Solex Carburetor Co. in England for attachment to Solex carburetors. It is being fitted to automobiles intended for export to mountainous countries—Bolivia, Peru, Mexico, etc.—and for competition work in the Alps.

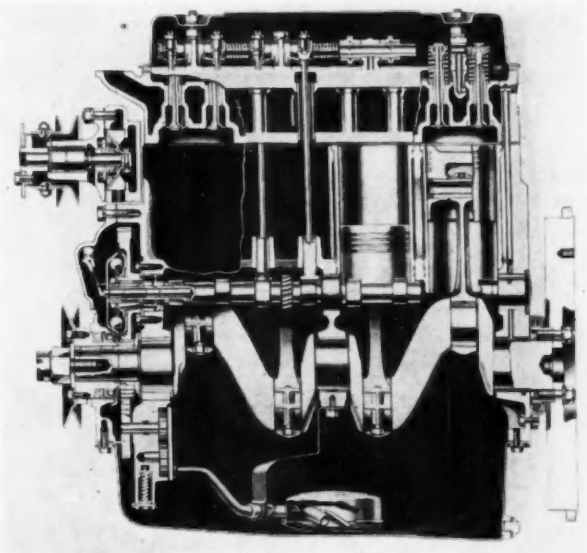
The corrector is screwed into the body of the carburetor in place of the main jet carrier, and has at one end a main jet and also a needle valve controlled by an altitude capsule. At sea level the capsule has no effect on the needle valve, but under atmospheric depression the needle progressively closes the annular space, thus reducing the supply of fuel. The normal setting, which should not require any adjustment, reduces the quantity of fuel 25 per cent for an altitude of about 13,000 ft.

• • •

Rotating Valve Tractor Engine

HARRY FERGUSON, INC., has recently brought out a new tractor along with a new tractor engine—these were described in the September 15 issue of AUTOMOTIVE INDUSTRIES. Presented here are longitudinal and transverse sectional views of the four-cyl, valve-in-head engine that was developed for the Ferguson model 30 tractor.

The engine has a bore and stroke of 3¼ in. by 3⅞ in. giving a displacement of 129 cu in. Bare engine output is 35 bhp at 2000 rpm—an increase of 20 per cent over the previous model—with a 6.5 to one compression ratio. Positive acting rotating type exhaust valves are included as standard equipment.



Cutaway view of the new tractor engine put out by Harry Ferguson, Inc.

More Forgings

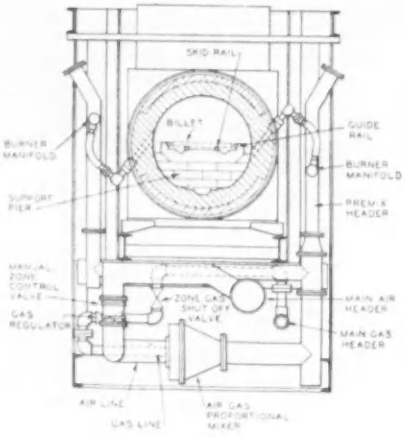


Fig. 2—Transverse section of the furnace shown in Fig. 1. Billets are advanced by a pusher along water cooled rails. Gas-air mixture is fed in tangent to the inner wall of the barrel which supplies radiant heat to the billets.

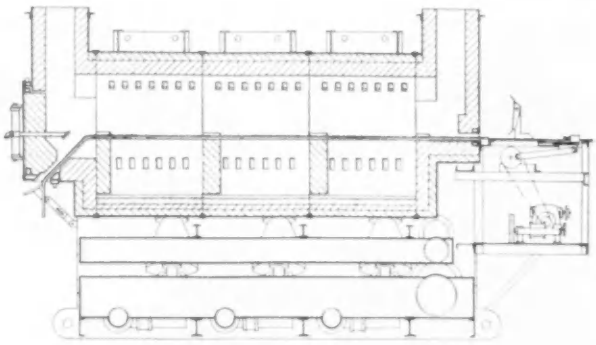


Fig. 3—Longitudinal section of the high-speed radiant heating furnace for knuckle support billets fed by the pusher at right. Heated billets drop through the throat at left. This furnace is made in three separately removable sections.

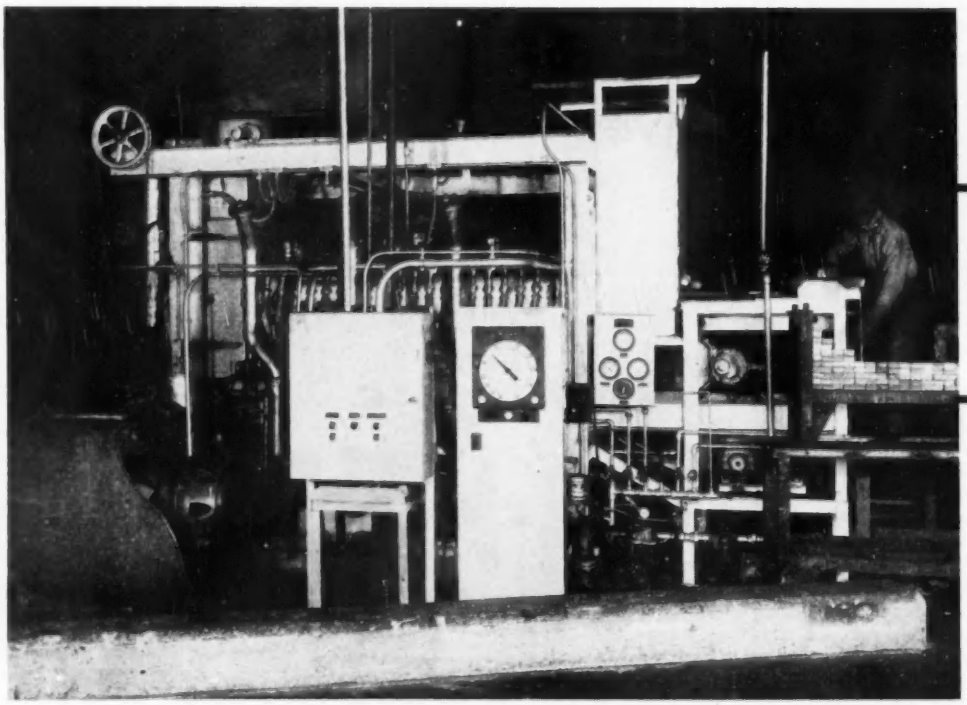


Fig. 1—Control side of the Surface Combustion furnace used for rapid heating of billets for knuckle support forgings. Billets are loaded to the pusher by hand.

With Radiant Furnaces

at Oldsmobile Plant

Knuckle Supports Are Produced at Rate of 500 per Hour from 250 Billets Weighing 17.2 Lb Each, Heated in One Setup. Another, for Ring Gear Billets, Has Feeding Conveyor and Transfer Device That Keeps Pusher Supplied.

By Herbert Chase

CHANGES made recently in the forge plant of the Oldsmobile Division, General Motors Corp., Lansing, Mich., have saved labor and simultaneously have increased the hourly output of knuckle support forgings by more than 10 per cent. These results were attained through installations of a barrel type Surface Combustion high speed radiant heating furnaces, Figs. 1, 2 and 3, using natural gas of 1000-Btu per cu ft heat content as fuel. A still later furnace of the same type is employed for heating gear billets.

In this type of furnace, which takes the place of the

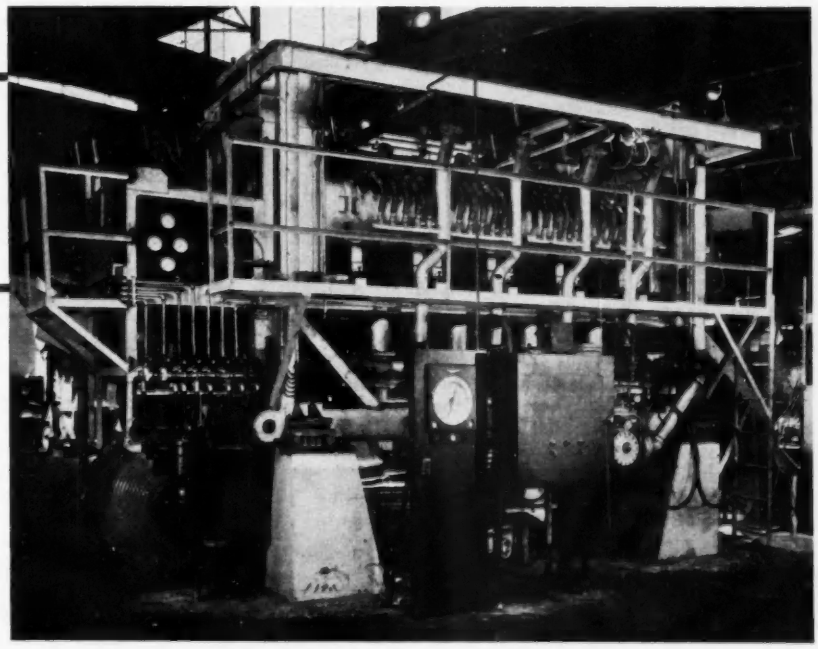


Fig. 7—Control side of the new furnace. Gas-air mixture is fed through manifolds under light presure. Two of the furnaces supporting piers equipped with vibration cushions appear at right and left.

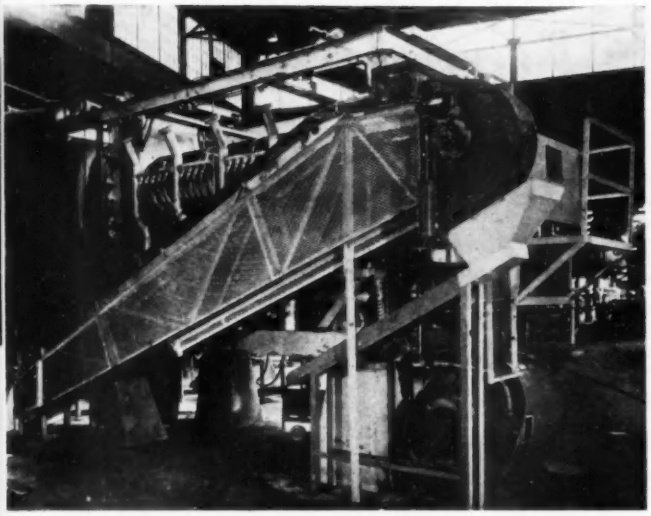


Fig. 4—Furnace for high speed radiant heating of ring gear billets that are elevated by the screen-covered charging conveyor to an air operated transfer device, parts of which appear at upper right.

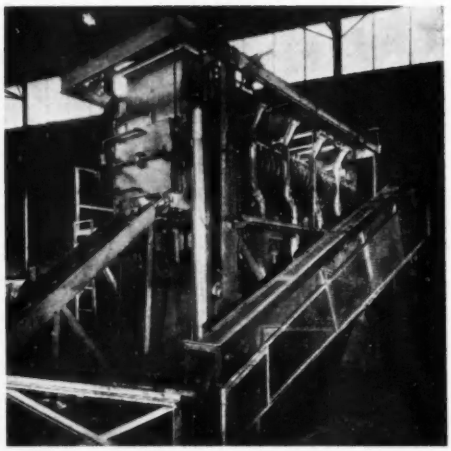


Fig. 5—Heated ring gear billets, discharged into the inclined chute at left center are carried by it to the forging press (not shown). Cold billets charged by hand into the roll conveyor at lower left are picked up by pins on charging conveyor links.

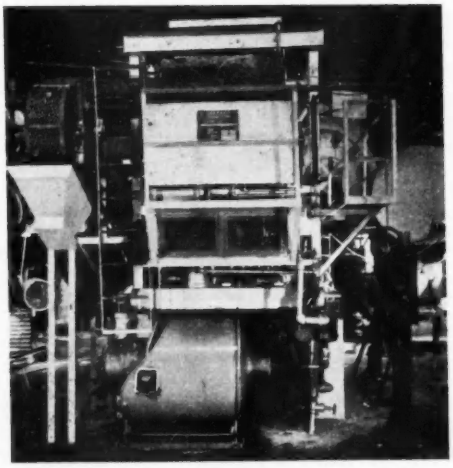


Fig. 6—Feeding end of the ring gear billet heater. Billets elevated by the conveyor at left are transferred to the pusher, back of the plate of upper center, that advances them through the furnace.

rotary furnaces formerly employed, knuckle support billets of modified SAE 1340 steel, weighing 17.2 lb each and measuring 1 5/16 by 2½ by 18½ in. are hand fed to a pusher that moves them, along the water cooled rails (see Fig. 2) through the center of the furnace. At exit, the billets slide down inclined rails to a point where an operator picks them up and, after a quick descaling, places them in the forging die. This arrangement eliminates an extra man formerly needed to unload billets from a rotary furnace.

In addition, 500 forgings an hour are produced, as against 450 before, and about 1¾ cu ft of gas per lb of steel heated is consumed. Actually, the furnace can heat 300 billets (enough for 600 forgings) an hour but, as yet, the average forging rate has not quite matched this possible heating rate.

Rapid heating is attained because billets pass through the center of the furnace near its axis and receive intense heat radiated radially inward from all directions from the incandescent refractory lining. Gas-air mixture is fed in tangentially and burns next to the refractory walls without impinging on the billets. Products of combustion escape through stacks of which there is one at each end of the furnace. Because of the fast heating, comparatively little scale is formed and this is removed by a quick water blast applied just before shifting each billet into the forging die.

Furnace controls are so arranged that, if the forging press must be shut down, pressing a button results in stopping the pusher, closing dampers to reduce the flow of gas and changing the gas-air ratio so that billets in the furnace are blanketed in protective holding atmosphere. As a result, billets do not scale excessively nor do they have to be removed from the furnace before production is resumed.

With the pusher set to feed one billet each 12 sec, the rate of transit through the furnace approximates one ft a min and time in the furnace is about 6½ min. Billets attain a temperature of 2250-2350 F. Rails along which billets are moved are of pipe, cooled by water forced through at a controlled rate, and cost little to replace. The furnace is built in three

(*Turn to page* 82, *please*)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

New Tax Laws Needed to Stimulate Plant Modernization. Permanently Operating National Machine Tool Reserve Program Seen as Essential.

Machine Tool Commission Being Established

Recently, Clay P. Bedford, special assistant to Secretary of Defense Lovett, testified before a Senate Small Business subcommittee. Mr. Bedford said, in effect, that the Office of Defense Mobilization is setting up a machine tool commission as a principal step in getting faster production of more essentially needed tools. Commission personnel will be hired to review the status of tool orders with a view toward putting emphasis on tools with a "must" classification. About 27 projects are on the commissions' program, but the actual steps this organization will take in trying to improve the machine tool situation are not for open discussion, according to Mr. Bedford. It was found out after the meeting, however, that one of the items on the agenda is machine tool stockpiling, or as Mr. Bedford likes to think of it "reserve."

Commenting on the heavy press program for the Air Force, Mr. Bedford stated that he sees no objection to a 75,000 ton press, although the USAF has no plan for building one under the current program.

Increased Shipments Predicted

Warner & Swasey Co. recently predicted increased shipments for 1952, as the result of increased production facilities. The forecast was made in the face of a simultaneous statement that the company had received cancellations on 354 machine tools, 244 of them for the Air Force. However, it was pointed out, that this loss has not been felt as yet to any appreciable degree because of a remaining sizable backlog, which stood at $43 million at the end of 1951, exclusive of $10 million under negotiation.

Press Standardization

The E. G. Budd Co., producers of automotive body stampings and railroad equipment, played host to representatives of passenger car manufacturers and other automotive suppliers for the Joint Industry Conference on Press Standardization, April 8 and 9. During the two-day conference many press problems were discussed in closed sessions.

Machine Tool Forum

Frederick S. Blackall, Jr., president and treasurer of the Taft-Pierce Mfg. Co., and president of the NMTBA, stated, in an address before the Westinghouse Machine Tool Forum held in Buffalo, N. Y., April 1 and 2, that any machine tool stockpiling program will be ineffective, if not indeed detrimental to our economy unless it includes detailed and wise procedures which will keep the reserve up to date and yet dispose of the periodically discarded surplus without at once prostrating the machine tool builder, and foisting unused but nevertheless obsolete machine tools upon American industry. He went on to say that it seems obvious that the establishment of some sort of a permanently operating national machine tool reserve program is essential to our security.

"Our tax laws, now largely a hodgepodge of administrative interpretation and legislative amendment, need to be overhauled with a forthright recognition of what is needed to keep a strong nation strong," said Mr. Blackall. He continued, "The provision of our tax laws and regulations relating to depreciation allowances should be drawn in such manner as to stimulate rather than to discourage the constant modernization of our national industrial plant, not as an emergency measure for use only when the enemy is at the gates, but as a permanent cornerstone of tax policy."

Foreign Machine Tools

Several American machine tool builders have commented recently on the import of foreign made tools in the U. S. At the recent ASTE show, Joseph Geschelin, Detroit Editor of AUTOMOTIVE INDUSTRIES, did some research on the foreign tool situation. He interviewed both American users and foreign builders. Rather than duplicate his efforts, we refer you to his very informative article, beginning on page ??.

Concerning importers, Kurt Orban, president of Kurt Orban Co., Inc., has reported that American importers are facing keen competition from the British. It seems as though the British, for example, offer a 50 per cent down payment to the Germans for tools as compared to less liberal arrangements by the Americans. Even with the more favorable British terms, German producers prefer to sell to the U. S. to develop markets here.

It is interesting that the E. W. Bliss Co. has just sent another large metalworking press to Europe to be used for the production of automobile body stampings in the Peugeot plant. Evidently when the Europeans want production machinery, they have to come to the American machinery manufacturers to get it. The press by the way is a four-point single-action machine with a 1000 ton capacity and a bed width of 240 in. from side to side.

Machines Discussed at Technical Meeting

At the Second Annual Meeting of the Technical Societies Council of N. J., Hans Ernst, director of research for Cincinnati Milling Machine Co., was one of the principal speakers. Speaking on developments in machine tools and cutting methods, he took up some of the new and improved milling machines that are going to the aircraft industry, improved automatic contour machining mechanisms, tool life tests, and machining titanium. Cincinnati Milling has been doing much research with radioactive tool bits for tool life tests.

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Gage for Automotive Crankshaft

Sheffield automotive crankshaft gage.

Information has been released on an unusual machine for the multiple gaging of the critical dimensions on an automotive crankshaft. It checks main bearings for size and taper; pilot hole diameters; flange diameters and runout; thrust bearing faces; keyway locations, etc.

In operation the part to be gaged is placed in a loading cradle, elevated above the gaging units for protection and ease of loading. A hand lever is operated to actuate a hydraulic device to automatically lower the part into gaging position. A range of dimensions up to 34 or more can be gaged and read simultaneously at the float graph, or Airchart formed by the float positions in the Precisionaire columns. The part is revolved on rolls to gage the concentricities and runouts. A hand type air snap is used for gaging the crankpins for diameter and taper in three places simultaneously on the journal. After the gaging operation is completed, the hydraulic device, actuated as in loading by the hand lever, raises the part to gaging position.

All gaging anvil surfaces are tungsten carbide inserts. *Sheffield Corp.*

Circle E-1 on page 65 for more data

Air-Driven Grinding Spindles Cover Wide Speed Range

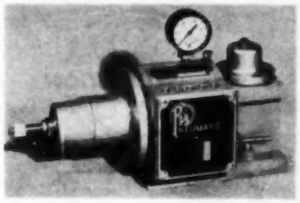
Recently developed is a high speed pneumatic grinding head. Two units are now in production to cover the speed range of 35,000 to 100,000 rpm. This range is said to provide the most efficient cutting speed (approximately 5000 surface fpm) for grinding wheels or points ranging from 5/32-in. to ¾-in. diam. A low range unit can be adjusted to hold any selected speed within 35,000 to 50,000 rpm and a high range unit within 60,000 to 100,000 rpm.

The heads are designed to operate from an air supply providing approximately 25 cfm at 80 to 100 psi. A line filter is provided to clean the air before it enters the head, where it is distributed through internal passages to a turbine to drive the spindle, a speed governor control, and to the air lubricated bearings. Line fluctuation is removed by passing the air through a regulating valve to provide even pressure to the speed governor control.

The heads are operated by opening a plug valve, between the supply and

the turbine, with a level located on the front side. Speeds are adjusted by means of a needle valve, located on top of the head, using the pressure gage, in conjunction with speed chart on the name plate, to select the desired speed.

One of the features of these heads, is their ability to operate under grinding load with very small droop from the preset idling speed. The speed governor control, which makes this possible, works on the principle of the air gage to measure the deflection of a ring of whirling cantilevers. Assembled to the inner end of the spindle, these cantilevers surround and nearly seal a small air orifice. As the turbine increases in speed, centrifugal force



P & W air-driven internal grinding spindle.

springs the cantilevers away from the orifice unsealing it and causing a change in air pressure in the line feeding the orifice. This change in pressure is used to work the throttle valve which supplies the correct amount of power air to the turbine to maintain the preset speed regardless of grinding load.

Another feature is the air bearings on which the spindle floats. The air lubricated journals and thrust bearings, of this design, have no apparent speed limitations, and function as well or better at 100,000 rpm, as at low speeds. The spindle and turbine are floated on air jets and make no metal-to-metal contact with bushings, except when bearing pressure is removed. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

Circle E-2 on page 65 for more data

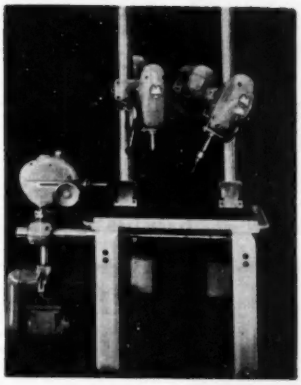
Universal Multiple Drilling Machine

A different type of industrial drilling machine is now being produced. Called Magna Drill, it is said to make possible quick, accurate setups for simultaneous multiple drilling in more than one plane.

Basically, Magna Drill consists of a standardized, individually powered, adjustable drill head with a mounting system of ground steel tubes and joint castings that permits flexibility in locating any number of spindle axes independent of each other. Each spindle operates individually with the proper rpm, correct feed rate, pre-set drilling pressure and depth limitation for the operation it is performing.

Magna Drill's flexibility is such that any number of heads can be quickly set to drill to the center of a sphere from any point on surface of sphere. Heads will take any attachment and perform any operation practical on conventional drilling machines. Mechanical or air powered feeds, which rectly on the quill front, can be at- are complete package units driving di- tached or removed in a few minutes, according to the maker.

This unit has a capacity of one in. in cast iron, ¾ in. in steel. Stroke is



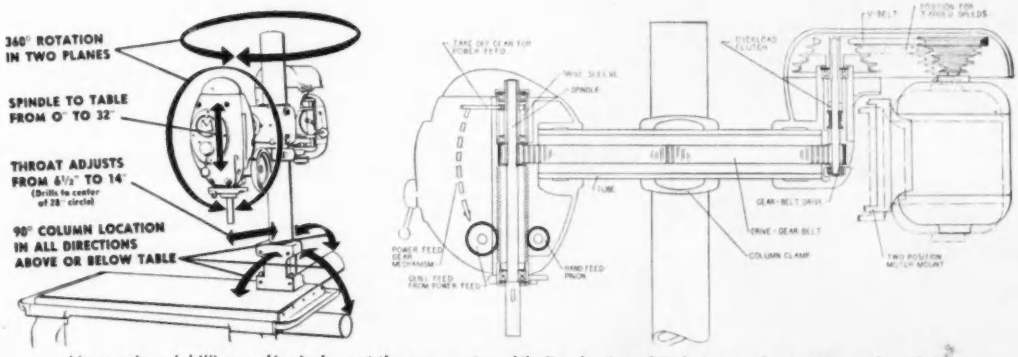
full five in. Throat is adjustable from 6½ in. minimum to 14 in. maximum so it drills to the center of a 28 in. circle. Each head has its own one hp motor. Clearance is 32 in. under spindle tip at maximum height. Narrow head design permits drilling on six in. centers but by opposing spindles horizontally, zero centers can be attained.

A cam actuated motor mount gives seven available spindle speeds; maximum range is from 251 to 6860 rpm. Feed levers are reversible for right or left hand operation. Depth stop is an improved micro-adjustment type with positive lock. Maintenance is minimized; lifetime lubricated sealed oversize ball bearings throughout. Adjustments are effected through 360 deg protractors on movable joints with vernier lines for quick precision setup.

Columns are 3½ in. ground steel tubing, ⅜ in. wall. Tables are cast iron, surface ground top and bottom; drilled and tapped top and bottom for mounting heads in variety of positions; ends finished, have dowel holes for ganging in multiples or attaching coolant troughs. *Magna Engineering Corp.*

Circle E-3 on page 65 for more data

(Turn to page 60, please)


360° ROTATION IN TWO PLANES
SPINDLE TO TABLE FROM 0° TO 32°
THROAT ADJUSTS FROM 6½" TO 14"
(Drills to center of 28" circle)
90° COLUMN LOCATION IN ALL DIRECTIONS ABOVE OR BELOW TABLE

Magna universal drilling machine is shown at the upper center, while line drawings of its features and operation are shown below.

NEW EQUIPMENT PLANT • PRODUCTION

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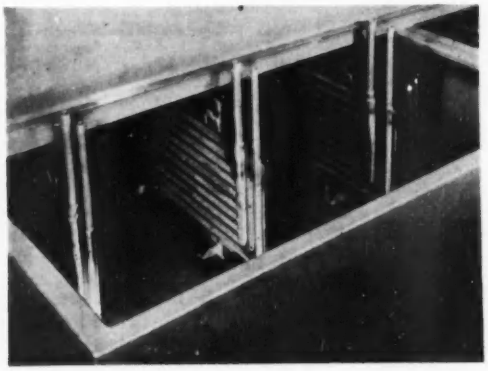
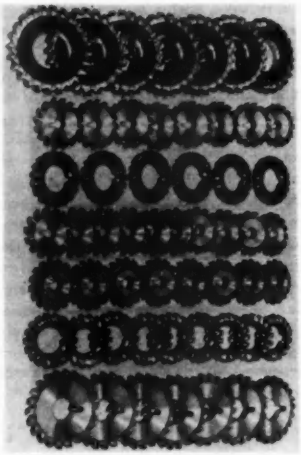
(*Continued from page 59*)

Heat Transfer Unit



Desired BTU transfer is said to be achieved with a unit only half the size needed using conventional methods. This unit, known as a Platecoil, requires less steel because the heating solution flows in channels formed by joining the two embossed metal surface plates. Because of this construction, the plate type unit has a large prime heating surface. (Kold-Hold Mfg. Co.)

Circle E-4 on page 65 for more data

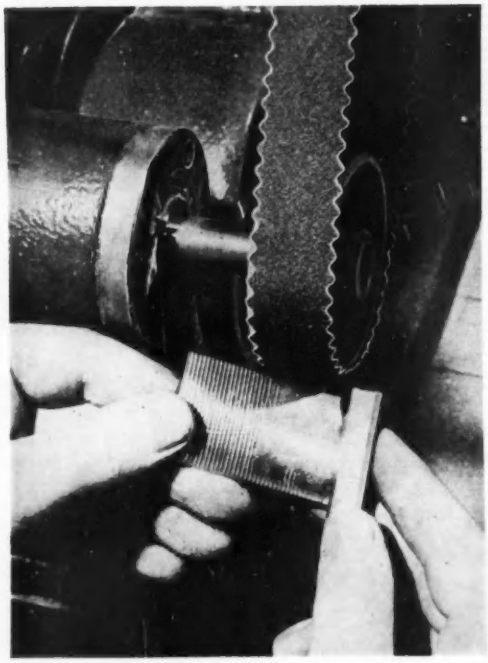


Carbide Tipped Cutters

Special carbide tipped cutters for milling the airfoil form of stainless steel jet compressor blades have recently been developed. These milling cutters are designed to stand up under heavy cuts in this tough material. They are equipped with the grade of carbide that has proved best in long production runs. (Continental Tool Works Div., Ex-Cell-O Corp.)

Circle E-5 on page 65 for more data.

Serrated-Edge Abrasive Grinding Belt



Minnesota serrated abrasive belt.

Introduced as the 3 M brand Scallop-Edge abrasive belt, a serrated-edge grinding belt is designed for automatic precision grinding and finishing of jet turbine and compressor blades in a single operation. In use, the scallops of the belt curve around the edges of the contact wheel, allowing fillet areas to be polished on the edge-contour of the wheel.

Use of the Scallop-Edge belt on an automatic grinder is said to make it possible to produce a completely precision-finished turbine blade in a single machine operation requiring only half the time and completely eliminating any hand finishing. It reduces the finishing cost per blade by 20 per cent to 50 per cent varying with the production line method, the firm said.

The belt is used on crowned, contoured or rounded-edge wheels, or with shaped back-up supports ,and can be used either by machine or by hand. It is available in all standard abrasive belt constructions. *Minnesota Mining and Mfg. Co.*

Circle E-6 on page 65 for more data.

High-Lift Platform Truck

Yale high-lift platform truck.

A telescopic high-lift platform Worksaver, a powered hand truck specially designed for the high stacking of skids and skid bins, has been made available.

This 4000-lb-capacity model has a lowered platform height of 6½-in., and will lift loads up to as high as 126½-in. For stability and traction, the unit has an articulated frame that permits continuous floor contact of load and drive wheels.

The hoist pushbutton is located on the operator's control handle. A conveniently located hand- or foot-operated lowering control on the front of the battery compartment permits adjustable-speed lowering. Twin hydraulic pumps and motors are used for fast lifting. The hydraulic system includes a relief valve to protect the equipment from harmful overloads.

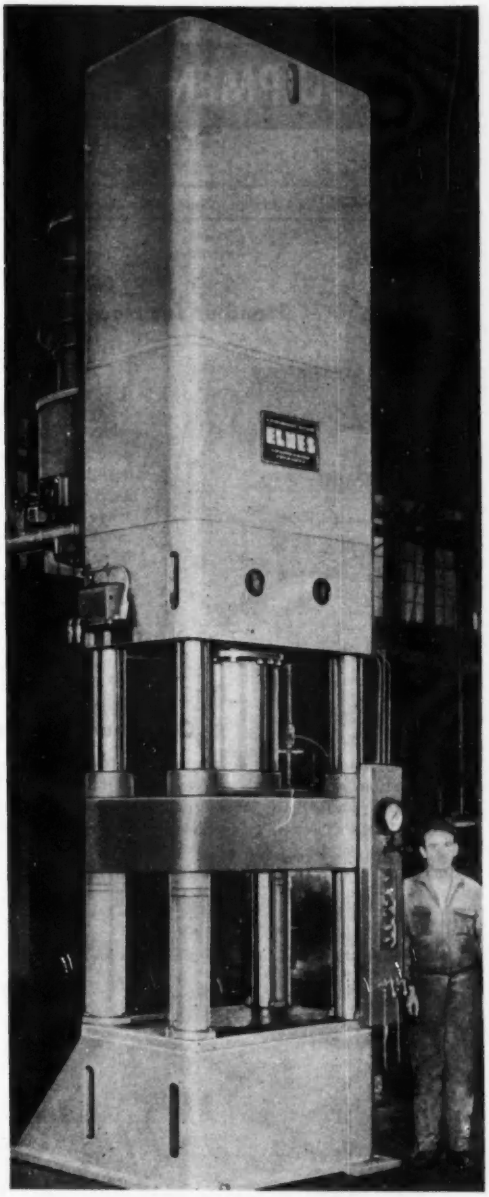
For safety, the Worksaver's brakes are applied and power is "off" when the control handle is either in the full-up or full-down position. *The Yale & Towne Manufacturing Co., Philadelphia Div.*

Circle E-7 on page 65 for more data.

Pipeless Hydraulic Presses

Built on the revolutionary principle of pipeless construction, a line of hydraulic presses are said to constitute an important advance in hydraulic engineering. All high-pressure fluid in the main circuit is conducted through short, direct passages drilled in the structural parts. Any type of metal-working press can be supplied with the pipeless construction, and this construction is available at no premium. (American Steel Foundries, Elmes Engineering Div.)

Circle E-8 on page 65 for more data



Hardening Compound for Steel and Cast Iron

Hard'N'Tuff, a new-type steel hardening compound that is said to provide a nitriding, chromizing and a carburizing effect to metal surfaces, is now available. The part is heated, coated with a paste or powder, the coating fused, and the part quenched.

The compound is claimed to be effective on steel and cast iron parts and is applied after the metal is raised to the proper temperature. A soft 1020 carbon steel can be raised to a hardness of about 60 Rockwell C or 600 Brinell, to improve the structural quality, hardness and wear resistance of the metal.

Application of the material is said to increase the service life of high-speed drills, cutting edges and wearing surfaces. *Doughy Laboratories, Inc.*

Circle E-9 on page 65 for more data.

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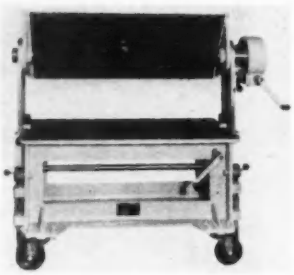
(Continued from page 61)

Handler for Heavy Dies

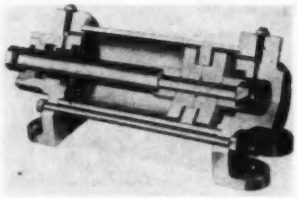


Hansford die handler.

A die handler has been developed for the handling and disassembly of heavy dies.

It will handle dies up to 23 in. wide, 43 in. long, shut height from nine in. to 14 in. and weighing up to one ton. The upper platen which has a 20 in. by 42 in. area has a vertical travel of 16½ in. This platen is mounted on steel trunnions running in anti-friction bearings and it may be rotated 360 deg by the upper hand crank. A locking pin may be used at five of the angular positions. *Hansford Mfg. Co.*

Circle E-10 on page 65 for more data



Air Cylinder

A line of T-J Super Cushion air cylinders, designed with flexible cushion sealing has been announced.

Wear on the sealing element is automatically compensated for by its sealing with pressure characteristics, according to the firm. Also, because of this cushion design, the friction factor is claimed to be lower.

The T-J cylinder also employs a new-type packing nut, incorporating a piloted diameter. The female adaptor feature is an integral part of the packing nut. Metallic male adaptor ring used in piston rod stuffing box gives added support to the chevron type packing.

Basic design of the cylinder is safety-stressed for air line pressures up to 100 psi. The cylinder is available in seven standard styles for all types of mounting requirements. Capacities 100 lb to 12 000 lb, for power movement in any direction. (Tomkins-Johnson Co.)

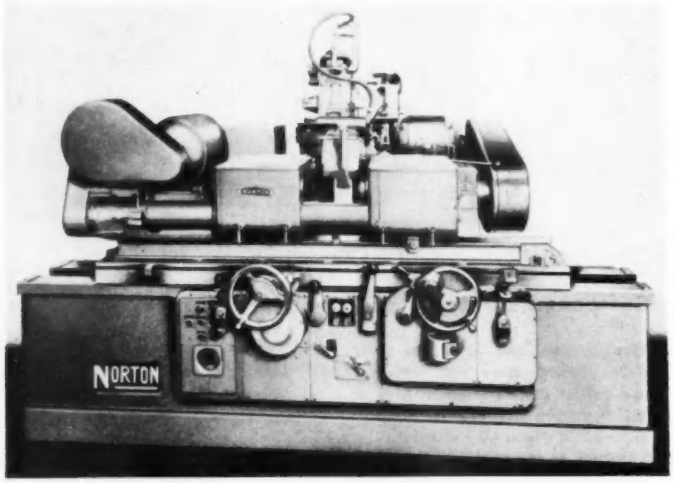
Circle E-11 on page 65 for more data

Compound Contour Jet Blade Grinder

Equipment has been now developed for production grinding of the external airfoil surface of jet engine turbine blades including buckets, blades, vanes, nozzles, etc.

Known as the compound contour jet blade grinder, this development incorporates Type CTU grinding machine features in basic design.

The blades are held on an arbor between synchronously-driven, left-hand and right-hand shape-producing units which impart the figure "8" motion to the arbor for grinding blade forms. The cams in each unit give a rise and fall to the machine's work spindle together with an in-and-out swinging motion for controlling blade shape.



Norton compound contour jet blade grinder.

Arranging relationship of one unit to the other is possible because of this feature, so that the path of the rotating work spindles when supporting an arbor can cause a blade to be ground to a varying shape from one end of the piece to the other.

The work arbor is removable. It is supported by ball-nose type centers which are held in the spindles of the shape-producing units. The arbor is designed to suit the specific conditions of the blade, and to support the blade at the required angle. Blade design determines the number that can be held on the arbor. Certain designs permit two or three blades to be accommodated. The removable type arbor provides the advantage of using one arbor for loading while another is at work in the machine.

Width of external airfoil surface that can be ground in this equipment is governed by blade type.

For reduction of manual effort and for consistent productivity, the machine is equipped with an automatic grinding cycle. *Norton Co.*

Circle E-12 on page 65 for more data

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NEW PRODUCTS

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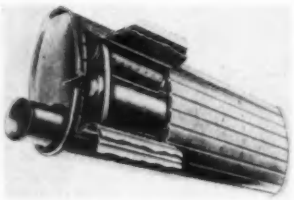
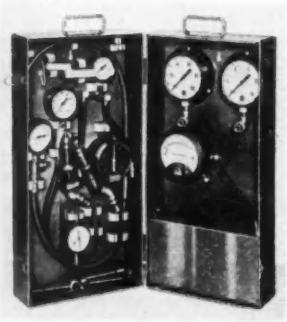


Muffler for High Compression Engines

A muffler has recently been developed that is said to silence excessive shell noises created by the introduction of high compression engines. The muffler, which features "fenced-in" silencing, has been made with a series of longitudinal ribs in the outer shell of the muffler. These ribs barely touch the inner shell, to create parallel chambers about 1¼ in. wide and as long as the muffler. The dead air spaces provided by these chambers between the inner and outer shells are said to absorb shell vibrations. *Oldberg Manufacturing Co.*

Circle P-1 on page 65 for more data



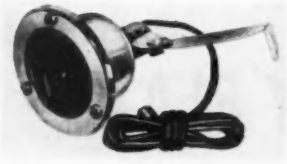
Test Kit for G.M. Diesel Engines

A basic diagnosis test kit, designed for use on G.M. Diesel engines, has been announced. The kit, Tool No. J 4209-41, includes all equipment required for checking timing, exhaust back pressure, engine rpm, blower intake restriction, air box, oil, crankcase pressure, plus cylinder liner position on all Series 71 and 6-110 G.M. Diesel engines.

All equipment is mounted in a sturdy, lightweight metal box. It includes: zero to 15 lb and zero to 100 lb U. S. pressure gages, Magnehelic gage, zero to 3600 rpm tachometer with flexible extension and adapters, dial indicator with attachments, and cylinder liner gage block.

Also available are Tool Nos. J 1319-A and J 4494, compression gages for G.M. Diesel engines, Series 71 and 6-110, and a fuel pressure gage for both series of engines. *Kent-Moore Organization, Inc.*

Circle P-2 on page 65 for more data

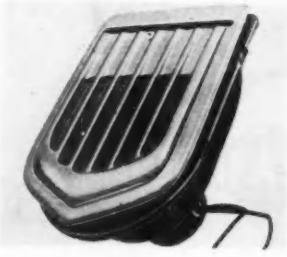


Headlight Glare Eliminator

Now available is a unit called Polarvision Light that is said to eliminate headlight glare. Based on the principle of complementing and reducing oncoming headlight, streetlight, etcetera, glare by adding low spectrum light to it, the Polarvision Light fits all cars, trucks.

This light discovery utilizes an Ergon glass lens to produce a black light. *Electronic Developments.*

Circle P-3 on page 65 for more data



Defroster for Rear Window

A defogging and defrosting unit for the rear window of passenger cars has been recently developed. This unit is now in volume production for three leading car manufacturers.

Warmed inside car air is first drawn into the unit and then dispelled as a concentrated jet of high velocity against the rear window. It is installed flush with the shelf space behind the rear seat. The unit is controlled from the standard heater switch and is mounted in the rear shelf space by cutting a hole in the cardboard covering it. *Eaton Manufacturing Co.*

Circle P-4 on page 65 for more data

(*Turn to page* 68, *please*)

Free INFORMATION SERVICE

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FREE LITERATURE

High Strength Plastics

Fabrication of six basic C-D high-strength plastics is discussed in a 64-page pocket book. It contains 14 sections on such subjects as economics in ordering, general machining tips, machining operations, forming and drawing, and finishing. A section on tables and measurements is also included. The basic plastics discussed are Diamond Fibre, Vulcoid, Dilecto, Celoron, spiral tubing, and Micabond. *Continental Diamond Fibre Co.*

Circle L-1 on postcard for free copy.

Silicones

"What's a Silicone?" is the title of a 32-page booklet that tells the various uses of silicone. There are nine sections concerning silicone polishes, water repellents, fluids, release agents, lubricants, defoamers, rubber, protective coatings, and electrical insulation. *Dow Corning Corp.*

Circle L-2 on postcard for free copy.

Control System for Steel Normalizing

A complete automatic control system for continuous strip steel normalizing is described in Instrumentation Data Sheet 6.4-10. Heating zone temperatures are accurately measured and controlled according to a predetermined program, and the temperature of the strip leaving the furnace is continuously recorded. The speed of the fast moving strip—information of vital importance in establishing the control temperature, is also continuously measured and recorded. *Brown Instruments Div., Minneapolis-Honeywell Regulator Co.*

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Automotive Aerials

Describing the Top-Flyte aerial line, a catalog gives full specifications of the various models. Particular emphasis is placed on the Magic-Ball, an exclusive aerial that permits five min installation. *The Gabriel Co.*

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Cloth Bag Dust Collector

Now being offered is an eight-page bulletin on a new cloth-bag dust collector for carbon black, cork, fine wood, graphite, pigments, lime, soap, metal oxides and similar dusts. Illustrated by 12 photos, seven line drawings, and two elevation drawings, the bulletin tells how the cloth-bag collectors work, and how they are installed and maintained. It also gives specifications of standard collector sizes and dimensions. *Pangborn Corp.*

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Coated Coil Enamelstrip

Production advantages of Enamelstrip, the metal coil pre-coated in color, are illustrated in a new four-

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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page folder. Included is an actual sample of Enamelstrip. The folder lists the metals which will be coated and precision slit to individual specifications. *Coated Coil Corp.*

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Tiny Zinc Die Castings

An informative booklet presents detailed data on the properties, design advantages and improved uses of tiny zinc alloy die castings. The book evaluates the uses of tiny cast parts. *Gries Reproducer Corp.*

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Galvanometers and Dynamometers

The complete line of standard galvanometers, dynamometers, d-c indicating amplifiers, and accessories for use in null-balance or calibrated deflection measurements is presented in a newly-revised (20-page Catalog, Section ED. This publication now describes and illustrates low-level d-c indicating amplifiers which can be used as null detectors, direct reading instruments, and recorder pre-amplifiers. *Leeds & Northrup Co.*

Circle L-8 on postcard for free copy.

Production Problem Solutions

Now available is a booklet "Air Power at Work." This special booklet contains the case histories of 39 different production problems with their solutions by means of semi-automatic or automatic combinations of various air-operated devices. Each different combination of workfeeders, air presses, timers, valves, etc., is pictured by photographs with a written description of the specific operational method. *Mead Specialties Co.*

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Materials Handling Equipment

A special series of broadsides, designed to explain specific points of interest to various groups of individuals concerned with materials handling problems and the use of fork lift trucks, is available. These broadsides are said to be useful in making fork lift truck equipment comparisons. *Towmotor Corp.*

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Mechanical and Hydraulic Presses

Just issued is a 28-page general catalog describing and illustrating a complete range of mechanical and hydraulic presses and special machinery for almost every type of metal-working operation. Condensed specifications and dimensions are included. *E. W. Bliss Co.*

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Lubrication Tools

Specialized lubrication tools—extension adapters, swivel adapters, suction guns, etc., are explained in an illustrated bulletin, "Selection Guide of Specialized Lubrication Tools." The guide is set up in chart form with the car make set up in the vertical column and the eight specialized tools strung out horizontally so that at the intersecting point the lubrication operation appears. *Alemite Div., Stewart-Warner Corp.*

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Ground and Unground Hobs

A four-page bulletin (H-52) discussing the applicability of various types of hobs—precision ground, Class "B" ground, accurate unground and "roughing" hobs—in the production of gears and splines, etc., has been released. The bulletin also contains a useful table of tolerances of the various types of hobs as guide to selection and application. Included are tolerances for the new "Michigan Process" accurate unground hobs. *Michigan Tool Co.*

Circle L-13 on postcard for free copy.

Steam Generators

Just released is a fully-illustrated booklet on the automatic, self-contained Clayton steam generator. Details are given on specific industrial applications of the equipment in reducing costs while automatically supplying a dependable volume of steam at constant levels of temperature and pressure. The use of single and multiple installations is described. *Clayton Mfg. Co.*

Circle L-14 on postcard for free copy.

(*Please turn page*)

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L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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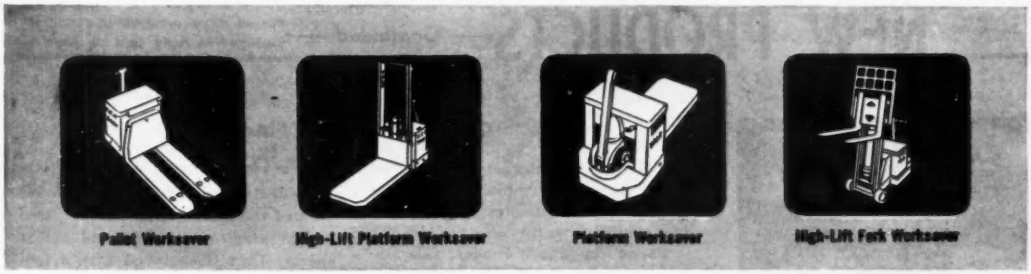

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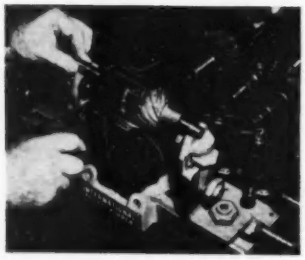
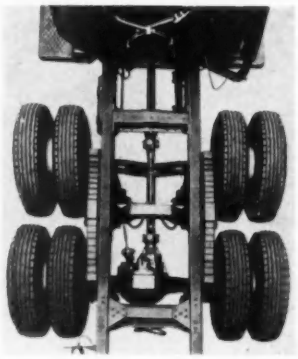


Generator Short Finder

Now on the market is a device which is said to rapidly detect and locate shorted windings in generator and starter armatures.

Called the Short Finder, this device consists of an aluminum base casting, to which is mounted a special type transformer, vertically and horizontally adjustable bearing standards, and a vertically adjustable trouble indicator. Two heavy test prods with leads are mounted at the back of the base casting and are used for blowing out copper and solder shorts. Unit is equipped with a foot switch and a 10-ft 14-2 line cord. The unit stands eight-in. high. *International Products Mfg. Co.*

Circle P-5 on page 65 for more data



Third Axle Units for Trucks

A line of pusher type, Super Load-Booster third axle units, with several unique features for truckers has been announced. Engineered for truck chassis with 34½ in. and 36½ in. frames, they feature a newly designed Torq-Leaf spring suspension, which is said to take engines of any torque capacity so long as the gross weight on the bogie axles does not exceed the rated capacity on each model. The spring now consists of nine plates 3½-in. wide by ½-in. thick. Springs are made with a flat plate spring clamp with wedge block adjustment and double-wrapped spring eyes.

Load-Boosters also feature 1952 Thornton Drives — tandem driving axle units for hauling on or off the highway.

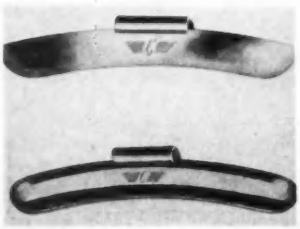
According to the manufacturer, the design features of the Super Load-Booster third axle units provide longer tire life, soft riding qualities, and vehicle stability. — *Detroit Automotive Products Corp.*

Circle P-6 on page 65 for more data

Low-Pressure Tire

A further addition to its line of low-pressure tires has been announced. Termed the Marathon, the tire incorporates the same basic principles as the firm's original low-pressure unit—the Super-Cushion. The Marathon was designed to meet popular demand for a lower priced replacement tire, rather than as an original equipment unit, Goodyear development men state. They point out also that the tire has exceptionally good tread wear characteristics for its quality level, together with the many other advantages. Marathon is made in all the popular low-pressure sizes from 6.40 through 7.60. The tire will be immediately available. *Goodyear Tire & Rubber Co.*

Circle P-7 on page 65 for more data



Wheel Weights for Passenger Cars

A complete line of weights, called the Champion line of weights, has been placed on the market.

Series A (standard type) is for all standard wheel assemblies. Produced in ½ ounce graduations in sizes of ½ ounce through 6 ounce. There is said to be no interference with the narrow decorative trim rings so popular on today's automobiles.

Series B (thin type) is for all special clearance conditions. It is produced in ¼ ounce graduations in sizes from ¼ ounce through 3 ounce.

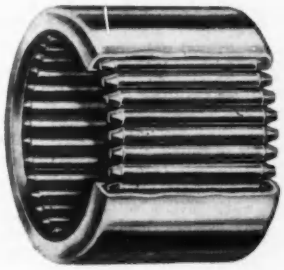
The company states that it plans to introduce a line of Champion truck weights later. *Harley C. Loney Co.*

Circle P-8 on page 65 for more data

when high capacity pays off...

Torrington Needle Bearings are designed to handle heavy loads. A full complement of small diameter rollers distributes the load evenly over a large area. Thus—for a given O.D.—a Needle Bearing has greater rated radial load capacity than any other type of anti-friction bearing.

Other Needle Bearing advantages—compact size, light weight, ease of installation and maintenance—pay off, too. So let our engineers help you—as they have many others—take full advantage of Torrington Needle Bearings in *your* product.



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(*Continued from page* 23)

NEWS of the AUTOMOTIVE and AVIATION Industries

Features Wanted in New Cars Shown in Survey by AAA

According to a recent limited survey conducted by the American Automobile Association, a method for adjusting the height of the front seat and a gage indicating the level of engine oil were given as the two features most desired in future cars. Congested highways were reported as the most vexing driving condition, while careless drivers and glaring headlights were next.

OPS Grants Willys Station Wagon Ceiling Increases

The Office of Price Stabilization recently approved increases ranging from $51 to $63 in factory list price ceilings on 1952 Willys station wagons. New ceilings for the various types are as follows: 473 model — $1692, formerly $1631; 673 model—$1771, previously $1708; and 4 x 473 model—$2092, against $2041. OPS also established a ceiling of $1800 for the 685 model, which was not produced in 1951.

GE to Produce Armament Equipment for Bomber

General Electric Co. recently announced that it is undertaking a program for the Air Force to produce armament equipment which the company has developed for the Boeing B-47 Stratojet bomber. The company's Electronics Div. and the Aeronautic and Systems Div. will join in meeting production requirements for the equipment. The Air Force has also designated Avco Manufacturing Corp.'s Crosley Div. as an additional source of supply.

Goodyear Develops Rubber Powder for Highway Use

Goodyear Tire & Rubber Co. recently announced development of a new synthetic rubber powder for use in roads. Developed in cooperation with Berry Asphalt Co., the powder, made by co-recipitation of a butadiene-styrene latex and a mineral filler, is said to mix freely with asphalt.

The rubber can reportedly be made available in two forms: as the co-precipitate with some of the fine mineral aggregate normally used in bituminous concrete, or as a pre-mix with powdered asphalt. It is claimed that tests have shown the new highway rubber to be extremely effective in resisting the stripping action of water and frost.

New GE Automatic Pilot Developed for Jet Planes

General Electric Co. has announced development of a new type of automatic pilot that is said to represent a major step toward complete push-button control of high-speed jet interceptor planes.

Designated the G-3, the autopilot was developed by the company's Aeronautic and Ordnance Systems Div. in cooperation with the Navy Bureau of Aeronautics. It is claimed that the device will control the plane with accuracy and stability at near-sonic speeds and can be used in such maneuvers as gunnery runs on enemy aircraft.

Chrysler Output Rate Below That of 1951

According to a recent announcement by Chrysler Corp., production in U. S. plants of Plymouth, Dodge, DeSoto, and Chrysler passenger cars and Dodge trucks—including military and other Government vehicles—for the first two months of 1952 totaled 181,113 in U. S. plants, compared with 224,635 for the same period in 1951. The 1952 figures are preliminary and subject to change.

Westinghouse to Raise Capacity 50 Per Cent

Westinghouse Electric Corp. recently disclosed that its productive capacity will be increased 50 per cent by 1955 under an expansion program currently in progress. It is said that approximately $300 million will be needed to finance the cost of new plants and facilities.

GM Scrap Collections Hit Sizable Total

General Motors Corp. has announced that its plants, dealers, and suppliers have collected a total of 111 550,636 lb, or more than 49,799 gross tons, of non-production scrap metal since July 1, 1951. The total tonnage is said to be the weight equivalent of nearly 2231 light tanks.

American Brake Shoe Buys Calif. Plant for Forging

American Brake Shoe Co. has announced the purchase of the Jumbo Products Co. plant, Azusa, Calif., and reportedly plans to convert it into a forging plant. Said to be the company's first forge plant on the West Coast, the plant will be run by its American Forge Div. and will, according to the announcement, begin operations in approximately three months.

Goodrich to Proceed on Los Angeles Expansion

B. F. Goodrich Co. has announced that it is ready to go ahead with a major expansion program at its Los Angeles, Calif., tire and tube manufacturing plant. It is stated that recent approval of the proposed expansion by the National Production Authority will enable the start of construction soon on the over $2 million project.

New machinery and production facilities in the expansion plan will reportedly increase present production by more than 20 per cent. It is said that the new construction will add 175,000 sq ft of floor space to give the plant a total area of 803,748 sq ft.

Government Demand Strong for Jeeps During 1951

Willys-Overland Motors, Inc., recently announced that the Government purchased over $5 million worth of civilian Jeeps and Willys-built trucks and station wagons in 1951 for use by non-military departments. Fleet sales, largely to the General Services Administration, were at a new high level, with the need increasing among a score of agencies for the versatility provided by the four-wheel-drive feature available on these vehicles, the company said.

Minnesota Mining Sales Attained Peak in 1951

Minnesota Mining & Manufacturing Co. has disclosed that its sales during 1951 hit a high of $170,067.527, 11 per cent above a former record of $152,806,-313 set in 1950. Net income after taxes of $23.9 million, however, declined to $15,738,452 from a total of $20,318,904 in 1950.

Pacific Airmotive Sales Set a New High for Firm

Pacific Airmotive Corp. has reported that its sales for 1951 reached a new high of $23,938,229, an increase of approximately 75 per cent over 1950's sales of $13,702,547. Military sales accounted for about 54 per cent of the 1951 total. Net income in 1951 was $740,074, compared with $543,633 in 1950.

(*Turn to page* 76, *please*)

Charles Edward Johnson

1875 • 1952

CHARLES E. JOHNSON was born on a farm near Newaygo, Michigan, in 1875. He became, in turn, a woodworker, a cabinet maker, a laborer in a bicycle factory. He designed camshafts for Muskegon Motor Specialties and became tool room foreman for Continental Motors.

In 1911, with Paul R. Beardsley, he founded the Piston Ring Company, which later became the Sealed Power Corporation. They produced their first piston rings at night and during weekends, while holding other jobs. The quality of the rings soon brought orders that required full-time operation. The two partners then went on the payroll at 30 cents an hour each.

Mr. Johnson's inventive genius resulted in better and better piston rings. Ultimately he held dozens of patents and his insatiable interest in things mechanical persisted to the instant of his death which took place as he was working on the engine of his automobile.

Today, Sealed Power Piston Rings, Pistons, Cylinder Sleeves, and Motor Parts are known and respected all over the world. Sealed Power Piston Rings are used as original equipment by manufacturers of more than 80% of all makes of passenger cars and commercial engines.

The story of Charles E. Johnson and Sealed Power is another splendid chapter in the American saga of free enterprise.

Sealed Power Corporation

MUSKEGON, MICHIGAN

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to January 25 authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the March 15 issue, page 503, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration between January 25 and March 26.

Included in this latest tabulation, 7748 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $15,588,700,000. These figures are exclusive of cases that are up for later review but included in this list — in these cases no dollar amount is listed. The figure appearing in parantheses is the percentage authorized for actual fast tax write off.

— A —

The Adams Engineering Co., Solon, Ohio
Aircraft parts—$160,000 (65)

ACF Brill Motors Co., Phila., Pa.
Aircraft & Ordnance parts—63,748 (65)
Aircraft parts—$60,522 (65)

Advance Die & Tool Co., Cleveland, O.
Aircraft and ordnance parts—$19,887 (80)

Aeroquip Corp., Jackson, Mich.
Aircraft parts—$39,560 (50)
Aircraft parts—$22,069 (65)

Affiliated Gas Equipment, Monrovia, Cal.
Aircraft parts—$329,390 (65)

Airborne Accessories Corp., Hillside, N.J.
Assemblies for aircraft—$133,466 (65)

Air Associates, Inc., Teterboro, N. J.
Aircraft parts—$167,461 (75)

The Aircraftsmen Co., Gardena, Calif.
Aircraft components—$80,000 (65)

The Aircraft Fitting Co., Cleveland, Ohio
Aircraft parts—$39,460 (50)

Aircraft Hardware Mfg. Co., Inc., New York, N. Y.
Aircraft and parts—$18,045 (50)

Airdraulics Co., Pasadena, Calif.
Aircraft parts—$42,866 (70)

Air Transport Mfg. Co., Los Angeles, Cal.
Aircraft components—$9,074 (65)

Airtron, Inc., Linden, N. J.
Aircraft parts—$103,410 (75)

Allan Edwards, Inc., Tulsa, Okla.
Aircraft parts—$33,507 (70)

Allied Aircraft Co., N. Hollywood, Calif.
Electronic equipment—$50,000 (65)

Allied Tool Products, No. Hollywood, Cal.
Aircraft components—$26,257 (80)

Allis-Chalmers Mfg. Co., Springfield, Ill.
Earth moving equipment—$13,579,649 (50)

Alloy Products Co., Marion, Ind.
Aircraft parts—$51,206 (70)
Aircraft parts—$117,200 (70)

Almac Mfg. Co., El Monte, Calif.
Aircraft parts—$23,485 (70)

Aluminum Cooking Utensil Co., New Kensington, Pa.
Aircraft parts—$75,920 (65)

Aluminum Industries, Inc., Cincinnati, O.
Aluminum castings for aircraft—$172,741 (65)

Aluminum Taper Milling Co., Culver City, Calif.
Aircraft parts—$86,014 (80)

American Non-Gran Bronze Co., Berwyn, Pa.
Aircraft parts—$22,631 (70)

American Welding & Mfg. Co., Warren, Ohio.
Aircraft parts—$1,051,190 (65)

Andrews-Alderfer Processing Co., Inc., Akron, Ohio.
Aircraft parts—$18,895 (65)

The Armstrong Rubber Co., West Haven, Conn.
Tires and tubes—$3,365,615 (45)

Atlas Crankshaft, Inc., Fostoria, Ohio.
Ordance—$223,170 (65)

Axelson Mfg. Co., Vernon, Calif.
Aircraft landing gears—$123,479 (65)

— B —

Baldwin-Lima Corp., Burnham, Pa.
Ordnance—$30,500 (65)
Ordnance—$71,750 (65)
Ordnance—$19,500 (65)

Baldwin-Lima Hamilton Corp., Lima, Ohio.
Earth moving equipment—$322,839 (50)

Beacon Machine Co., Inc., East Hartford, Conn.
Aircraft parts—$14,000 (50)

Beaver Gear Works, Inc., Rockford, Ill.
Aircraft parts—$3,365 (50)

Bell Aircraft Corp., Wheatfield, N. Y.
Aircraft and parts—$79,508 (65)

The Bemco Co., Columbus, Ohio.
Aircraft parts—$18,940 (70)

Bendix Aviation Corp., No. Hollywood, Calif.
Aircraft parts—$62,521 (65)

Bendix Aviation Corp., Home Office, Sidney, N. Y.
Aircraft parts—$191,200 (65)
Aircraft parts—$274,003 (65)

Bendix Aviation Corp., Teterboro, N. J.
Automatic pilot system—$396,225 (65)
Aircraft accessories—$109,396 (65)

Bendix Aviation Corp., Towson, Md.
Electronic equipment—$133,485 (65)

The B. B. Corp., New York, N. Y.
Aircraft parts—$69,314 (65)

Black, Sivalls & Bryson, Inc., Oklahoma City, Okla.
Aircraft parts—$1,078,326 (65)

Bloomfield Tool Corp., Bloomfield, N. J.
Aircraft parts—$110,927 (80)

Bock Mfg. Co., Farmingdale, N. Y.
Aircraft parts—$4,230 (75)

Boeing Airplane Co., Seattle, Wash.
Production of airplanes and spare parts—$475,396 (65)

Borg-Warner Corp., Auburn, Ind.
Gears—$58,447 (65)

Borg-Warner Corp., Chicago, Ill.
Ordnance—$1,028,407 (65)
Aircraft parts—$211,595 (65)

Borg-Warner Corp., Memphis, Tenn.
Ordnance—$201,880 (65)

Bowser, Inc., Ft. Wayne, Ind.
Aircraft parts—$162,644 (65)

The Budd Co. ,Detroit, Mich.
Ordnance—$337,939 (50)

Buhl Mfg. Co., Detroit, Mich.
Aircraft parts—$8,677 (75)

Burroughs Adding Machine Co., Plymouth, Mich.
Aircraft parts—$1,800,000 (65)

Burroughs Adding Machine Co., Detroit, Mich.
Aircraft instruments—$656,452 (65)

Burton Auto Spring Corp., Chicago, Ill.
Ordnance—$20,865 (65)

— C —

California Rubber Products, Inc., Hawthorne, Calif.
Aircraft parts—$41,500 (50)

California Reinforced Plastics Co., Berkeley, Calif.
Aircraft improvements—$146,600 (70)

Castle Industries, Inc., Everett, Wash.
Aircraft metal parts—$52,307 (65)

C. & E. Mfg. Co., Detroit, Mich.
Aircraft parts—$57,634 (75)

Cell-Form Co., Los Angeles, Calif.
Aircraft and ordnance parts—$103,250 (50)

Chicago Forging & Mfg. Co., Chicago, Ill.
Aircraft parts—$61,114 (80)

Chicago Rivet & Machine Co., Bellwood, Ill.
Parts for ordnance and aircraft—$32,947 (50)

Chicago Screw Co., Bellwood, Ill.
Aircraft parts—$371,466 (65)

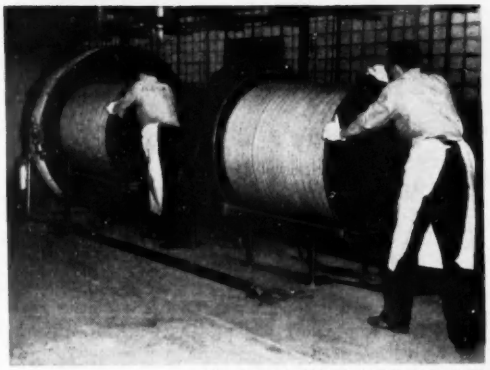
CIA-VAL Co., Alhambra, Calif.
Aircraft parts—$65,179 (70)

David Clark Co., Inc., Worcester, Mass.
Aircraft parts—$9,510 (50)

Coleman Co., Inc., Wichita, Kans.
Aircraft parts—$155,000 (65)

The Coleman Co., Inc., Wichita, Kans.
Aircraft parts—$287,339 (70)

(*Turn to page* 136, *please*)



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AIRBRIEFS

By ROBERT McLARREN

Poor Return

In a period of rapid expansion, during which cash reserves are essential, the aircraft industry finds itself in a continually worsening position. Mundy Peale, president of Republic Aviation Corp., reveals that his company's ratio of profit to sales in 1951 was a mere 2.24 per cent, and even this slim margin was down from the 4.1 per cent of the previous year. These figures typify the return on investment of the great majority of the airframe companies. Critics of the industry, including the Government itself, eagerly turn to the ratio of profit to net worth as an index. On this score the industry is made to look like a fattening calf in a period of expansion when sales climb astronomically while the net worth grows imperceptibly. Were the aircraft industry an ordinary business it would slowly disappear under such profitless operation but the Government steadfastly insists on a "strong and healthy aircraft industry" as the backbone of the nation's defense. This anomaly requires that either one of two possible solutions be adopted: Either the Government make special profit taxation allowances for the industry (even if only during periods of expansion in national emergency) or decisively loosen up its "allowable cost" regulations. This latter forces the industry to pay for many, many activities out of its own pocket including such costly items as proposals for new airplanes, a great deal of its research and development work, employee training programs and profit margins to its subcontractors. The incurable disease of low profits hardly befits an industry of which "strong and healthy" characteristics are demanded by its customer.

One-Shot Fighters

Those who have been condemning the continued use of .50-cal. machine guns on USAF fighters and insisting strongly on a quick conversion to missiles should find their answer in the new North American F-86D and Lockheed F-94C fighters, now coming off the production lines in Los Angeles. Neither of these aircraft carries machine guns. Both are armed by air-to-air rockets, either the standard 5-in. high velocity aircraft rockets, now in wide use in Korea, or by the huge 11¾-in. Tiny Tim rocket. After expending their rockets, these fighter aircraft are defenseless and must return to base. While the hitting power of the rockets is greater even than the broadside from a Navy destroyer, only 12-24 can be carried and these are expended in a fraction of the time required for the 350 rounds of .50-cal. ammunition carried for each gun (six in the F-86A now in Korea) in the "old-fashioned" fighter. For the missile proponents who favor this placing of the eggs in a small basket, here is their answer.

Yesterday's Weapon

The Navy has stated that it now has seven different fighter aircraft in or near production superior to the MiG-15 and the Aircraft Industries Association has added five more USAF fighters to round out the total to an even dozen. We are curious as to what aid and comfort this provides the citizen insofar as the MiG-15 was in production in 1947 and Russia must have a variety of more advanced models not only in production but ready for use against this new batch of U. S. aircraft, which are still on paper. One new Russian jet fighter already has been sighted in Korea but, as this is written, has not been tangled with by U. S. fighters. We must always fight today's war with the weapons we selected *five years ago* and that means many of these dozen new fighters "superior to the MiG-15" won't be ready for combat until 1953 at the earliest. Let's not get tripped up by the wool over our eyes!

Production Revealed

The press is now so used to silliness in security that it regards the latest development as simple routine. On no other point than aircraft production figures is the Air Force security officer so sensitive. Yet Undersecretary of Air Force Roswell L. Gilpatric has stated that deliveries are scheduled to reach 900 airplanes per month at the peak in June, 1953, and that production last month was only 55 per cent of that. It doesn't take a Russian spy to determine that the aircraft industry produced 500 military airplanes last month and this is precisely the figure that USAF security was set to protect with its life, if need be. Gilpatric went on to say that production today is double that of last year, that it will level off after the June, 1953, peak to a plateau of 450-500 aircraft per month. The peak output will be 14 million lb of airframe per month and

(*Turn to page* 78, *please*)

Many lives have been saved due to there being an AUTOMATIC "Stand-By" power plant to instantly take over when the main source of power fails.

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Automatic Engine Control Equipment

8151 NORTH RIDGEWAY AVENUE, SKOKIE, ILLINOIS

NEWS of the AUTOMOTIVE and AVIATION Industries

(Continued from page 70)

Blaw-Knox Sales Nearly Double Those of 1950

In its recent annual report to stockholders, Blaw-Knox Co. indicated that its sales during 1951 totaled $120,135,694, an increase of nearly 100 per cent over 1950 sales of $62,256,691. Net income rose from $3,205,377 in 1950 to $3,601,559 in 1951. The company entered 1952 with a backlog of $109.622 million.

United Aircraft Net Rises Slightly as Sales Soar

United Aircraft Corp. revealed in its recent annual report that a 55 per cent increase in sales during 1951 was required to attain an eight per cent gain in net income. Military orders accounted for 84 per cent of 1951 sales of over $417 million, compared with 87 per cent of 1950 sales of $269.255 million. Backlog at the end of 1951 stood at $1.3 billion, as against $715 million the previous year.

Universal Products Profits Drop as Sales Show Rise

Universal Products Co., Inc., has reported that its net sales for 1951 totaled $16.284 million, contrasted to $11,593,002 in 1950. Net profit, however, dropped to $1,213,950 from $1,540,529 the previous year.

White Sales Volume Goes Up Sharply as Net Rises a Bit

In its recent annual report, White Motor Co. stated that unit sales of trucks and buses in 1951 totaled 18,050, as against 14,856 in 1950, for an increase of 21 per cent. This volume resulted in a net sales record of $150,010,545, compared with $102,652,328 in 1950. Net income rose to $4,340,361 from $4,222,414 in 1950.

Big Percentage of Bendix War Work Farmed Out

More than 41 per cent of the $653 million in defense business on the books of Bendix Aviation Corp. will be spent with subcontractors, according to Malcolm B. Ferguson, president. It is estimated that $150 million, or 55 per cent of the $271 million Bendix will channel to subcontractors will go to companies classified as small businesses.

Bendix now is dealing with more than 6000 subcontractors and suppliers on its defense work. Currently, about 77 per cent of the company's total sales volume represents defense business.

1952 Nash Models Represent $16 Million Worth of Tooling

At a recent press showing of the company's 1952 models, officials of Nash Motors Div. of Nash-Kelvinator Corp. revealed that the new line required an outlay of $16 million for tools. They also stated that an additional $10 million was expended for both conversion and warehouse steel. A third point of interest was seen in the statement that Nash has ordered 203 of the recently announced Nash-Healey sports cars to be sold in the U. S. It is expected that these hand-built vehicles will be priced at approximately $5000.

Westinghouse Sales at All-Time High in 1951

Net income of Westinghouse Electric Corp. for 1951 amounted to $64.578 million, compared with net income in 1950 of $77.922 million. Net sales billed during 1951 set a new record for the company, totaling $1,240,801,000. This represents an increase of 22 per cent over the previous record of $1,019,923,000 net sales billed in 1950.

Raybestos-Manhattan Sales Up in Face of Net Income Fall

Raybestos-Manhattan, Inc., has reported that its net sales during 1951 were $84,866,074, as contrasted to $65,444,666 in 1950. Net income fell slightly from $4,868,769 in 1950 to $4,857,141. The report did not, however, include the net earnings of the company's Canadian subsidiary.

Elastic Stop Nut and AGA Agree on Merger

Stockholders of Elastic Stop Nut Corp. of America recently voted approval of the agreement of merger between ESNA and American Gas Accumulator Co. Under the terms of the merger the latter will be operated as a division of the former with present AGA management.

Erratum

In an article entitled "Boeing Awarded Contract for Atomic Engine Plane," which appeared on p. 116 of the April 1 issue of this publication, it was erroneously stated that Boeing would work closely with Pratt & Whitney Div. of Niles-Bement-Pond Co. It should have been Pratt & Whitney Div. of United Aircraft Corp.

GE and deHavilland Will Exchange Aircraft Data

Completion of an agreement for a full interchange of experience and knowledge between the Aircraft Gas Turbine Div. of General Electric Co., and deHavilland Engine Co., Ltd., of England was recently announced jointly by the two companies.

The agreement between deHavilland and the International General Electric Co., overseas affiliate of GE, provides for exchange of both current and future information in the aircraft gas turbine field with the exception of aircraft nuclear propulsion.

Cleveland Graphite Bronze Expects Greater 1952 Sales

Cleveland Graphite Bronze Co. has reported that its sales in 1951 totaled $49,463,559, compared with $42,187,243 in 1950. Net profit, however, dropped from $3,914,228 in 1950 to $2,887,826 in 1951. Even if expected revenues from the company's recent acquisition of Brush Development Co. are disregarded, it expects a higher volume of business in 1952.

Alcoa Sales Way Up As Net Income Falls

Although net sales reached a height of $534,514,905 in 1951, as opposed to $476,248,390 in 1950, Aluminum Co. of America's net income dropped from $46,856,597 in 1950 to $39,301,308 in 1951. Considerable optimism prevails in the company as to the future sales outlook, and its $330 million expansion program is expected to be completed by early 1953.

Allegheny Ludlum Sales Rise As Earnings Show a Decline

Allegheny Ludlum Steel Corp. has reported that its 1951 sales approximated $229 million, compared with sales of nearly $178 million in 1950. Earnings, however, declined from $9,814,891 in 1950 to $8,834,140 in 1951. The decrease was attributed to sharply increased taxes and production costs.

Autocar Sales and Profit Rise in Good Measure

Autocar Co., in its recent annual report, stated that its sales during 1951 totaled $34,842,549, contrasted to $28,110,742 in 1950. Net profit for the year totaled $1,269,797, compared with $491,359 in 1950.

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VALVE DIVISION

Thompson Products, Inc.

EUCLID, OHIO

YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

MEN *in the* NEWS

(*Continued from page 25*)

Le Roi Co.—**Harold N. Taylor** has been appointed assistant director of purchases.

ACF-Brill Motors Co.—**Vincent J. Madden** has been appointed purchasing agent.

Borg-Warner Corp., Wooster Div.—**A. F. Koch** has been made works manager.

Budd Co.—**Frank Mallee** has been named superintendent of the new tank plant.

Chrysler Corp., Chrysler Div.—**Maurice J. Harris, Charles B. Neely, Cornelius J. Curtan,** and **George J. McCarthy** have been promoted to sales executives.

Lincoln Electric Co., Machine Div.—**Edwin M. Miller** has been chosen plant superintendent.

Piasecki Helicopter Corp.—**Claude O. Witze** has been appointed director of public relations.

Vanadium Corp.—**George C. Floyd** has been elected a director.

Trailmobile, Inc.—**Paul W. Heasley** has been appointed vice president and controller, while **Lloyd R. Everhard** has been made secretary-treasurer. **Richard P. Kramer** has been named to head the Sales Training Dept.

Packard Motor Car Co.—**T. W. Nertney** has been chosen service technical manager in the Parts and Service Dept.

ACF-Brill Motors Co., Hall-Scott Div.—**Norton C. Sather** has been named assistant manager and **Donald M. Bristol,** purchasing agent.

Aluminum Co. of America—**Dr. Kent R. Van Horn** has been appointed director of research.

Van Norman Co.—**Charles R. Crowder** has been elected first vice president.

General Box Co.—**N. W. Embry** has been elected chairman of the board, and **J. A. Cragwall** has been made president.

United Aircraft Corp., Pratt & Whitney Div.—**Charles R. Skinner** has been promoted to purchasing agent of raw materials.

Interstate Drop Forge Co.—**Charles W. Stone** has been elected a vice president and a member of the board.

Milford Rivet & Machine Co.—**Vincent L. Bradford** has been made director of advertising.

Canadair, Ltd.—**John J. Hopkins** has been named chairman of the board and managing director, while **James G. Notman** succeeds him as president.

Wilkening Manufacturing Co., Replacement Div.—**Ralph W. Doherty** has been promoted to sales manager.

Ray-O-Vac Co.—**Dr. John Bjorksten** has been made head of research.

Muskegon Piston Ring Co.—**Paul S. Lane** and **Merrill D. Stanley** have been named vice presidents.

Link-Belt Co.—**Robert C. Becherer** has been elected president. **William J. Kelly** has been named to the board of directors.

Allis-Chalmers Manufacturing Co.—**J. D. Greensward** has been chosen to head the Apparatus Dept.

AIRBRIEFS

(*Continued from page 74*)

current output is 36 per cent of this expected peak, or about 5 million lb per month. Thus, each airplane represents about 10,000 lb of airframe weight. It is to be pointed out that Gilpatric's figure of 900 airplanes per month at the peak is the lowest figure yet announced. The Administration had earlier planned on a peak of 1250 airplanes per month and the so-called "stretch-out" reduced this to 950 airplanes per month, the latter figure revealed three months ago by Gilpatric himself.

Thunderclouds

Meanwhile, the Senate Armed Services Preparedness Subcommittee opened its hearings on the aircraft production program April 1 in an effort to determine if the postponement of the peak production date is in the national interest and if the multi-billion dollar program is being carefully administered. The potent group, headed by Senator Lyndon Johnson, already has achieved a glowing reputation for the breadth and sincerity of its operations and we believe the citizen can count on a forthright and honest answer on the aircraft production program when this group completes its hearings. Simple arithmetic indicates that against a constantly-mounting cost the U. S. is getting constantly-lessening air power, against a background of constantly-increasing international tension. Something is wrong somewhere; we know that Senator Johnson's group will find out—and speak out.

New Era Nears

The world's first regular jet airline service will start May 2, 1952, with the inaugural passenger flight of a De-Havilland Comet airliner from London to Johannesburg. This will lack only two weeks of being 11 years to the day since the first British jet aircraft flew, indicative of the standard decade-lag between military and civil aircraft performance. Since man flew at supersonic speed for the first time in August, 1947, this historic trend should permit regular passenger airline travel at supersonic speed in 1958 — but we doubt it. At the rate our present snarled aircraft production and development program is going, our military aircraft will only be flying regularly at supersonic speed by that date. There is always room to argue about British superiority in the aircraft gas turbine and military aircraft field but on this historic date the entire world must lift its hat and offer sincere congratulations to one of the cleanest "beats" in aeronautical history for Britain has "scooped" the world by many years in jetliner passenger service.

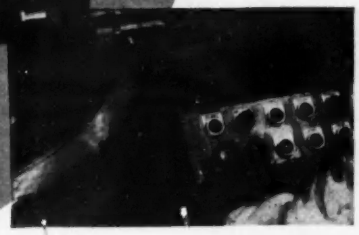
Britain Too

While the rise in military aircraft production costs in the U. S. have been well publicized, they are nothing compared to those in Great Britain, where aircraft costs are truly astronomic. While a North American F-86A Sabre, now fighting in Korea, costs $353,000, the Gloster Meteor, fighting beside it, costs $470,000. In the bomber category, the difference is even greater with the popular English Electric twin-jet design now selling for about $2.5 million per copy as compared to about $3.5 million for our Boeing B-47 Stratojet, which is a six-engine design of enormously greater complexity (we do not have any twin-jet bombers currently in production, although the Canberra will be in production by Glenn L. Martin this fall). The British are paying $3.2 million each for "general reconnaissance" aircraft not otherwise identified, although this may refer to the sleek new Vickers Valiant four-jet bomber. Such cost figures, of course, vary widely with the extent of production and the definition (i.e. whether it includes spare parts, etc.) and it is of interest to note that the new Convair F-102 delta-wing fighter will cost $991,580, compared with a figure one-third that much for the quantity-production Sabre. Even more fantastic is the figure of $5,291,560 each for the secret new Convair F2Y seaplane fighter, a single-seat airplane. This is the kind of thing that takes all reasoning out of a serious discussion of aircraft procurement.

MINUTES VS. HOURS

OF HYDRAULIC PIERCING **OF DRILLING AND MILLING**

This special purpose Danly Hydraulic Piercing Machine pierces nearly 100 accurately indexed slots in a high alloy jet engine shroud ring in less than 5 minutes. Many hours of costly drilling and milling would be required to complete the same operation with equal accuracy by ordinary methods.



Close-up view of the operator's control station showing complete selection of automatic or manual operating cycles. Also shown is the interchangeable, hydraulically activated index ring. Capacity of the machine is 56 tons at 10,000 psi. working pressure.

DANLY HYDRAULIC METALWORKING EQUIPMENT

Machines like this illustrate the truly amazing production time and cost savings that Danly's new line of Hydraulic Metalworking Equipment can achieve in a wide variety of operations . . . piercing, bending, trimming, extruding or riveting—under mass production or job shop conditions. Exclusive hydraulic circuit and power cylinder design features permit faster, smoother operation at higher pressures.

Call a Danly engineer today to see how Danly Hydraulic Metalworking Equipment will increase your output.

DANLY

DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue, Chicago 50, Illinois

hydraulic metalworking equipment . . . *Standard or Special*

AMERICAN CHEMICAL PAINT COMPANY

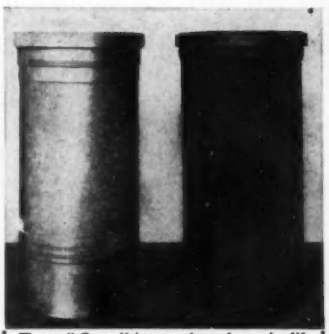
AMBLER ACP PENNA.

Technical Service Data Sheet

Subject: PROTECTING FRICTION SURFACES WITH THERMOIL GRANODINE®

INTRODUCTION

Fabricators and product designers, particularly in the automotive field, are aware that even highly polished surfaces under friction weld, gall and score. One of the most inexpensive and practical methods of preventing this is to coat the metal to prevent metal-to-metal contact. With cast iron or steel, the "Thermoil-Granodine" manganese-iron phosphate coating provides a wear-resistant layer of unusual effectiveness.



Thermoil-Granodizing greatly prolongs the life of parts subject to friction. It protects the surface of products like the diesel engine liners shown above and the many moving parts of automobiles and other machines. "Thermoil-Granodine" with its remarkable lubricating properties is particularly valuable in these and similar applications because of its ability to retain oil and maintain lubrication under high pressures and high velocities. This ACP wear-proofing chemical not only permits rapid break-in without scoring, scuffing and welding but also reduces subsequent wear on friction parts.

"THERMOIL-GRANODINE" PROTECTS RUBBING PARTS

Thermoil-Granodizing removes "fuzz" from ferrous metal friction surfaces and produces a coating of non-metallic, water-insoluble manganese-iron phosphate crystals which soak up and hold oil as bare untreated metal cannot do. The oiled crystalline "Thermoil-Granodine" coating on piston rings, pistons, cylinders, cylinder liners, cranks, cam-shafts, gears, tappets, valves, spiders and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, welding, galling and tearing of the metal. The work to be protectively treated is merely Thermoil-Granodized and oiled, usually with a soluble oil.

"THERMOIL-GRANODINE" MEETS THESE SPECIFICATIONS

SPECIFICATION NUMBER	SPECIFICATION TITLE
MIL-C-16232 Type I	Coatings — phosphate; oiled, slushed, or waxed (for ferrous metal surfaces) and phosphate treating compounds.
AN-F-20 (See also U.S.A. 3-213)	Finishes, for electronic equipment.
U.S.A. 57-0-2C Type II, Class A	Finishes, protective, for iron and steel parts.
U.S.A. 51-70-1 Finish 22.02, Class A	Painting and finishing of fire control instruments; general specification for
M-364	Navy aeronautical process specification for compound phosphate rust-proofing process.

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "THERMOIL-GRANODINE" AND ON YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES

CALENDAR

OF COMING SHOWS AND MEETINGS

Mobilgas Economy Run ..... Apr. 14-17

American Zinc Institute, 34th Annual Meeting, Hotel Statler, St. Louis, Mo. ..... Apr. 21-22

SAE Aeronautic Meeting, New York, N. Y. ..... Apr. 21-24

Turin Automobile Show, Turin, Italy ..... Apr. 23-May 4

Fifth Annual Hot Rod and Motor Sports Show, Los Angeles, Calif. Apr. 24-27

Metal Powder Show and Eighth Annual Meeting, Chicago, Ill. ..... Apr. 29-30

International Foundry Congress and Show, Atlantic City, N. J. ..... May 1-7

API Div. of Refining, San Francisco, Calif. ..... May 12-15

Society of Experimental Stress Analysis, Spring Meeting, Indianapolis, Ind. ..... May 14-16

American Helicopter Society, Eighth Annual Forum, Hotel Washington, Washington, D. C. ..... May 15-16

American Society for Quality Control (sixth annual meeting), Syracuse, N. Y. ..... May 22-24

Memorial Day 500 Mile Race, Indianapolis, Ind. ..... May 30

SAE Summer Meeting, Atlantic City, N. J. ..... June 1-6

Third Annual Conference on Industrial Research, Columbia Univ., New York, N. Y. ..... June 9-13

Triennial Meeting of the International Organization for Standardization, Columbia University, New York, N. Y. ..... June 9-21

National Truck, Trailer and Equipment Show, Los Angeles, Calif. June 12-15

Industrial Finishing Exposition, Chicago, Ill. ..... June 16-20

First International Exhibition of Aircraft Parts and Equipment, Hotel Park Sheraton, New York, N. Y. June 17-19

American Society of Mechanical Engineers, Applied Mechanics Div., Shock and Vibration Instrumentation Symposium, State College, Pa. ..... June 19-21

American Society for Testing Materials (annual meeting), New York City ..... June 23-27

SAE West Coast Meeting, San Francisco, Calif. ..... Aug. 11-13

American Standards Asso., Third National Standardization Conference, Chicago, Ill. ..... Sept. 8-10

Instrument Society of America (sixth annual meeting), Cleveland, Ohio ..... Sept. 8-12

SAE Tractor Meeting, Milwaukee, Wis. ..... Sept. 9-11

Paris Automobile Show, Paris, France Oct. 2-12

Society of Industrial Packaging and Materials Handling Engineers, 7th Annual Exposition, Chicago, Ill. ..... Oct. 14-16

37th International Motor Exhibition, London, England ..... Oct. 15-22

How passenger car seating engineers know **"ACOUSTACOIL"** *is the superior new complete seating assembly . . .*

Coated with Silence!

New over-all flock finish soundproofs and prevents rust.

New simplified foundation for the support of coils

Combines new type tubular frames with coils and foundation

New grille top and special undercut for extra toe-room

Double flat border wire assures comfort under knees

Car manufacturers' trim engineers know, from years of experience, they can't beat coil springs for greatest riding comfort! And now, with "Acoustacoil", they can't beat coils for low cost!

Here, for the first time, by combining the coil spring seat and back constructions with tubular frames, all in one complete assembly, car manufacturers pay less than for frames and spring units from separate sources! They also save on upholstering and installation, thanks to scientific new design simplifications! Specify "Acoustacoil" today for greatest comfort at lowest total cost! It's coated with silence!

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GENERAL OFFICES: 5560 Russell, Detroit 11, Michigan

IN CANADA: L. A. YOUNG INDUSTRIES, LTD., Windsor, Ontario

13 PLANTS: 2 in Detroit, Mich. • Chicago and Joliet, Ill. • Trenton, N. J. • Memphis, Tenn. Leeds, Ala. • Los Angeles and San Leandro, Calif. • Windsor, Toronto and Montreal, Canada

- Being installed as original equipment in cars of leading make!
- Hailed by seating engineers as the last word in luxury at lowest cost!
- Amazingly simplified design that saves greatly on critical materials!
- Easier to upholster and install on production line; lighter; stronger.

More Forgings with Radiant Furnaces

(*Continued from page 56*)

sections that are separately removable for relining.

Except for hand loading of the pusher, operation of the furnace is completely automatic, air and gas being fed by blowers that maintain a slight pressure in the furnace. This prevents air from entering through loading and discharge ports. A radiation type instrument controls furnace temperature by regulating the rate at which combustible mixture is fed.

Operation of the complete forging setup requires four men but an extra man acts as a relief, hence a crew of five men is employed. One man loads the billets into the pusher, and one picks up discharged billets, descales them and places them in the forging die. A third man operates the 2500-ton forging press, shifts forgings from blocker to finish impressions, lifts forgings from the latter and drops them in a chute down which they slide to a 160-ton trim press.

At the trim press, an operator shifts the forgings into the trim die, operates the press, lifts off the flash and drops it into a tote box. Forgings are pushed through the die and drop onto an elevating conveyor that deposits them in a tote box. Operation of the trim press keeps step with the forging press, of course, trimming being completed while the forgings and flash are still hot.

Still newer in this plant is the high speed furnace of the same make and type shown in Figs. 4 to 7. This furnace is employed for heating billets for ring gear forgings. Billets are of SAE 5120 modified steel, measure 4 by 4 by 3.34 in. and weigh 15.1 lb each. Billets are heated at the rate of 350 an hour while being advanced by a pusher. When up to forging temperature, 2300 F, the billets are ejected one at a time and are fed down a chute (left center in Fig. 5) from which they are picked up by hand tongs, descaled and passed to the forging press, left in Fig. 4.

In Fig. 5 is shown the discharge end of the furnace but it is also the end at which the charging conveyor (shown beside the furnace in Figs. 4 and 5) is loaded. Billets are taken from a hopper spotted next to the inclined roll conveyor, lower left in Fig. 5, and are placed on this conveyor by hand. At the lower end of the roll conveyor, one billet at a time is picked up by pins on conveyor links and the billets are elevated to a level where they are removed by an automatic air-operated transfer device and deposited, one at a time, in front of the pusher that advances the billets through the furnace.

Figure 6 shows the charging end of the furnace and the upper end of the loading conveyor below which there is a small hopper.

Controls and meters for the furnace are along the side shown in Fig. 7. They control the flow of gas to the furnace in such a way as to maintain a constant temperature after the furnace is up to heat. The furnace is supported on vibration absorbing mounts that rest on four concrete piers and is at a higher level than the furnace shown in Figs. 1 to 3.

Four duplicate sections are used in the ring gear furnace itself and they are so constructed that any of them can be removed individually for relining or other service work.

HARDENED & GROUND PARTS
to exact specification
This spring pivot bolt typifies our machining versatility and strict adherence to specifications. Bolt is made from 1⅞" high-carbon alloy steel hex bar stock; overall length, 5 5/16". Threads are precision cut, concentric with body diameter. After heat treating, threads are re-threaded to the specified pitch diameter. Bearing surface is ground to a fine micro-finish, ± .001 tolerance. The very latest equipment is used to make the knurling clean and sharp.
Brown Hardened and Ground Parts have served the automotive industry for over 40 years. Our specialty is precision machining, scientifically-controlled heat treating and micro-finish grinding. How can we serve you? Write or wire . . .
Experienced production on:
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
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Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
... anything in the hardened and ground line, of any analysis steel, up to 4"
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213 BELLEVUE AVE. SYRACUSE, N. Y.

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• NO DOWN TIME FOR DESLUDGING RESERVOIR

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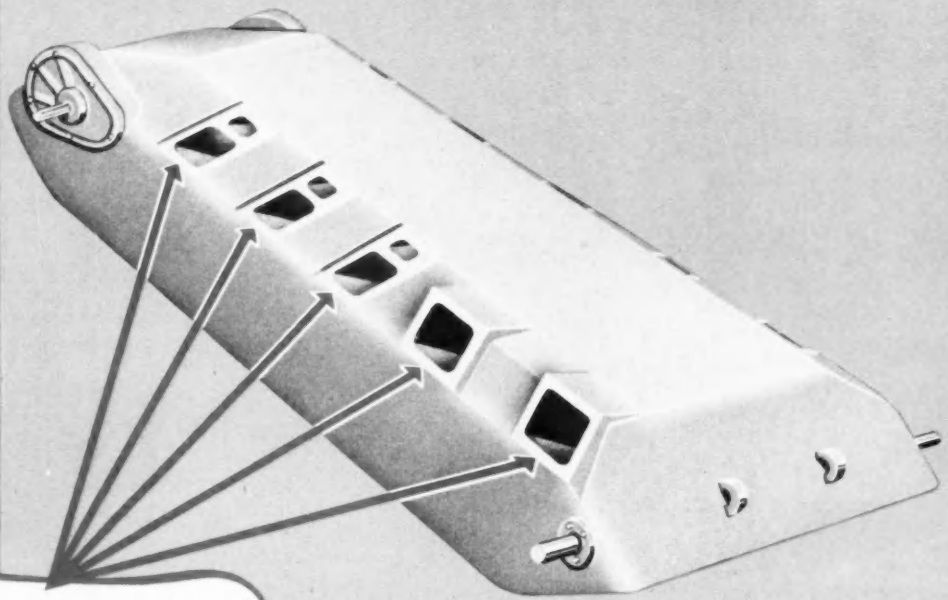
Problem...

HOW TO GRIND TANK HULL SUSPENSION MOUNTING PADS AT PRODUCTION SPEEDS . . .



Hard-to-get-to suspension mounting pads that had to be precision machined. The tough armor plate resisted existing methods.

PROBLEM . . .

Machining mounting surfaces for suspension assemblies on the underside of tank hulls consumed so much time that it slowed production throughout a vast tank plant. The machining had to be done on an angular surface on tough armor plate. It had to be extremely accurate. Each hull required ten separate setups, these done one at a time on a horizontal boring mill.

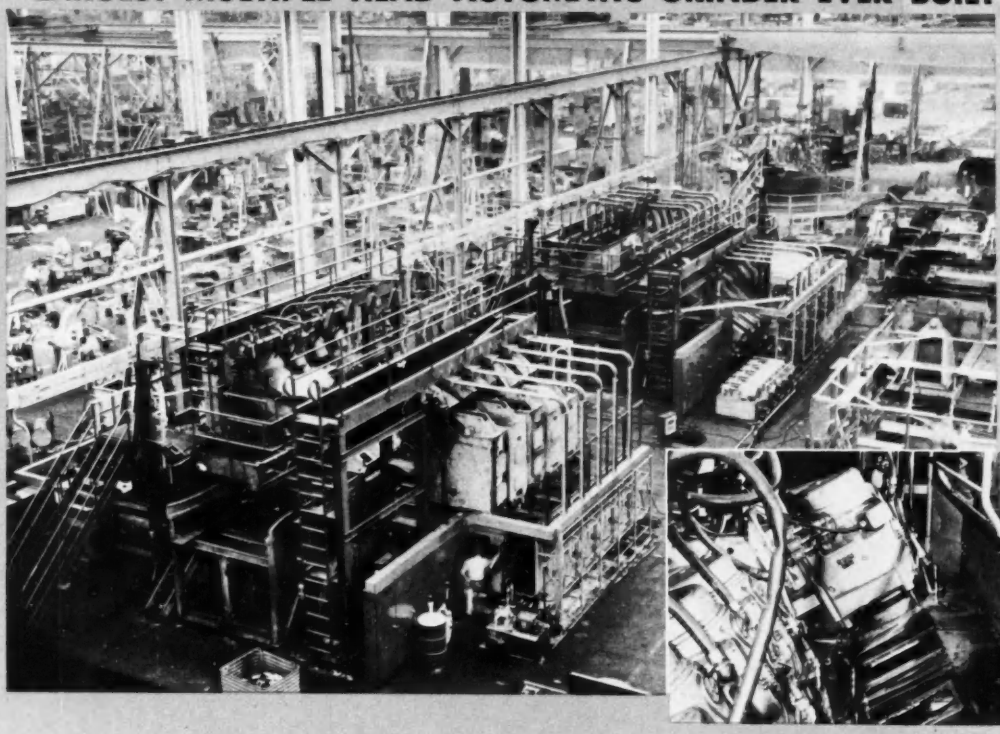
To iron out the bottle neck meant either one of two things. The company could add boring mills, or devise a machine to do the job. Adding mills would require a great deal of added space, the training of more operators, and a multiplication of the problems encountered in using a machine for a job for which it was not exactly suited.

SOLUTION . . .

The manufacturers contacted the Wean Equipment Corporation and outlined their problem. Wean set to work. Within a few months they had engineered a grinding machine that did the job 22 times faster than the old method. It is the largest multiple head grinding machine ever devised, and the first completely automatic adaption of a bank of grind-

Solution...

LARGEST MULTIPLE HEAD AUTOMATIC GRINDER EVER BUILT



ing heads to work on an angular surface. Weighing 350 tons, the Wean Grinding Machine grinds all ten surfaces simultaneously, and eliminates the possibility of human error in controlling the grinding head. Each of the 10 grinding heads is independently controlled and completely automatic. As the head moves back and forth across the surface of the mounting pad the depth of grind automatically increases with each pass. When the required depth is reached, the circular motion of the abrasive wheel stops and the grinding head withdraws. Automatic wheel dressing or cleaning removes all built up residue on wheel surface.

The intricate control system contains 15 miles of electric wire, hundreds of feet of pipe and 60,000 electrical connections, yet an operator can be trained to operate the machine in a single day.

THE ANSWER IS RESULTS . . .

The manufacturer, anticipating even greater production, has ordered a second grinding machine.

Getting results — finding the answers to the tough problems is why the Wean Equipment Corporation is a recognized leader in the field of special machinery for industry.

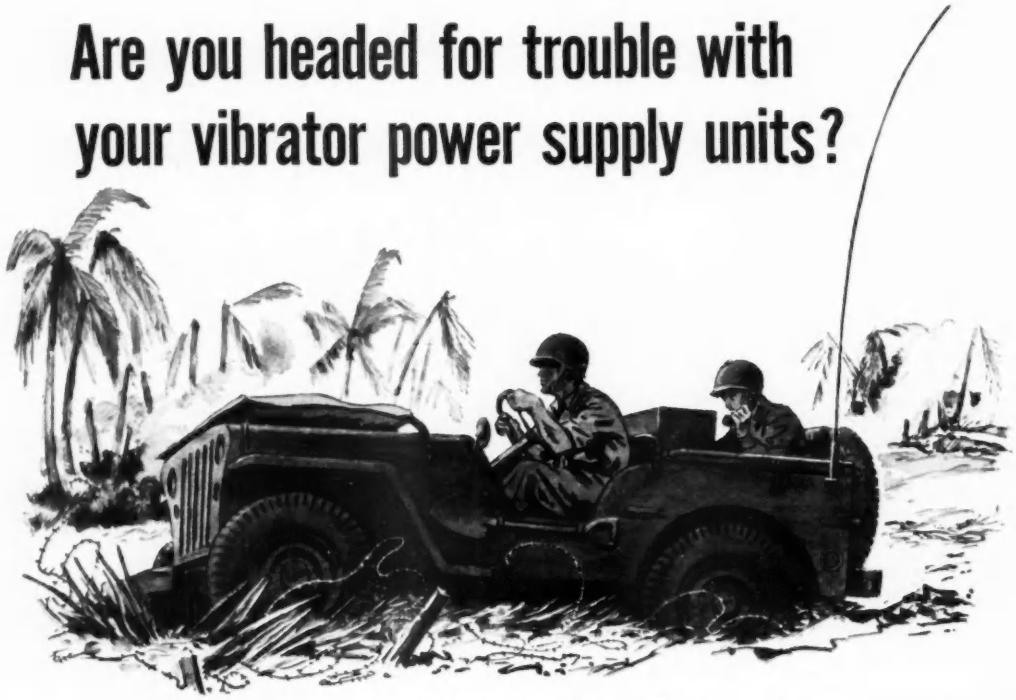
MACHINERY TODAY IS THE BUSINESS OF THE

EQUIPMENT CORPORATION

Wean

Cleveland, Ohio

Are you headed for trouble with your vibrator power supply units?



Specification of vibrator frequency, voltage and size is no guarantee that your power supply unit will do its job right . . . permit your mobile radio equipment to operate properly.

To get long, trouble-free performance, the power circuit must be designed so that the characteristics of the vibrator are in balance with the transformer and buffer capacitor.

That kind of designing is a job for experts . . . engineers with specialized knowledge, skill and experience.

Experienced manufacturers of mobile communications equipment turn to Mallory because they know Mallory has facilities, knowledge and engineering skills that are available nowhere else.

Mallory pioneered practical vibrator development . . . produced the first commercial vibrator more than 20 years ago. Since that time, Mallory has developed and produced many new and improved types of vibrators for both civilian and military use.

Today Mallory is recognized as the leader in the field and more Mallory vibrators are used as original equipment in mobile radios than all other makes combined.

You'll save yourself time, trouble and expense in connection with vibrator power supply units by calling on Mallory while your plans are in the design stage. Write or telephone Mallory today.

*Reg. U. S. Pat. Off.

Vibrators and Vibrapack* Power Supplies

P.R. MALLORY & CO. Inc.

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SERVING INDUSTRY WITH

Electromechanical Products—Resistors • Switches • TV Tuners • Vibrators
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P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

For information on Titanium Developments contact Mallory-Sharon Titanium Corp., Niles, Ohio.

Willys-Overland Body and Frame

(*Continued from page 47*)

Perspective drawing of the complete body shell assembly is shown in Fig. 2. This assembly is prepared by fixturing the backbone (Fig. 1) and tacking to it the right- and left-hand side panels, and the roof panel which also includes the forward cowl section. From this preliminary fixture the shell is moved into the master framing jig, illustrated here, where the major part of spot welding is performed.

Following preparatory welding in the framing jig, the body moves onto the body-in-white conveyor where strainers, brackets and other small elements are installed and secured, and arc-welding operations completed in a booth mounted over the conveyor line.

The package tray in the rear, although customarily a simple element of the body, in this case serves an important structural function and must be capable of supporting the rear seat which is suspended from the outer ledge. It is spot welded to brackets at the outer edge. In addition, the tray is braced by a long diagonal strainer from the floor on each side, and by shorter strainers to the wheelhouse.

Another noteworthy feature of construction is the means for securing the side panel to the underbody at the rear wheelhouse. Here they have developed a sill rein over the sill (note full lines in background, and dotted lines in the foreground) the inner wheelhouse being mechanically locked in this joint, then secured by spot welding on each side. This joint running from the lock pillar to the rear end is about 75 in. long and is treated with spot sealer.

Doors for this body are unconventional; they consist of simply the lower door panel assembly. On the assembly line at the W-O plant, a glass frame made up of a one-piece rolled steel section is fastened to the door panel, making for easy removal in the field.

Although the trunk lid is nicely fitted to the body during metal finishing at Murray, it is not finally hinged until the body goes through the assembly operations at Willys in Toledo. To accomplish this, Murray has provided a large number of "working" hinges, permitting temporary exterior mounting for the trunk lid. These hinges are actually tools and correspondingly expensive, although not expendable.

Painstaking attention has been given to good metal fits, particularly for window openings, door openings, hood and trunk lid openings. By controlling the stampings through niceties of die design and finish, Murray has succeeded in reducing the amount of solder ordinarily required to produce a satisfactory visual finish at certain critical areas.

TOUGH or EASY machining . . .

MORE THAN A "COOLANT" IS NEEDED

LITERALLY thousands of plants will testify that Stuart cutting fluids have been their only answer on *really tough* machining jobs. The research and experience that makes Stuart a leader on the tough jobs pays real dividends on the easy jobs. Stuart knows that *more than a "coolant" is needed* — that cooling, lubricity and anti-weld characteristics must be combined in a cutting fluid if optimum finish, tool life and production are to be secured.

This doesn't mean that you must have a different cutting fluid for every job, but it does mean you need a cutting fluid that is *right* for the job.

Send for NEW BOOKLET "MORE THAN A COOLANT IS NEEDED" and ask a Stuart representative to show you how the planned application of Stuart cutting fluids will give you more output, longer tool life, better finish and lower cost.

D. A. Stuart Oil Co. LIMITED
EST. 1865

TIME-TESTED Cutting Fluids and Lubricants

2733 S. Troy Street, Chicago 23, Ill.

Proper Truck Assembly Line Lubrication

(*Continued from page* 51)

line. Each supplements a function of the other.

Traveling conveyors of the roller or bar types are very widely used. The floor type propel the frames along the assembly line as the trucks are built up from the frame. Overhead types carry fenders, cabs, motors, hoods, and radiators from storage to paint shop and from there to the assembly line. These same overhead conveyors also can be used "merry-go-round" fashion for temporary storage of fenders or other body parts when necessary, in case there is any hold-up of the assembly line. The main conveyor chain may be adjusted to various floor levels to facilitate installation of certain parts, permitting the mechanics to work comfortably without too much stooping.

Lubrication of conveyor links is maintained by coating with grease. A good covering will effectually prevent penetration of shop dirt or paint as the conveyor carries the vehicle chassis through the paint compartment.

Floor level conveyors are driven by variable speed transmission units and a spur gear train, in order to obtain the very slow rate of travel of the conveyor. Speed reducers are well housed and their bearings are protected against dirt-contamination of the lubricant. Spur gearing in these mechanisms, however, may be too large to house economically so they may be run exposed, and covered only by a cage for safety of plant personnel.

Motors and variable speed transmissions are often equipped with ball bearings. Pressure grease lubrication prevails and the construction normally includes well designed seals to prevent entry of abrasive dirt and leakage of lubricant.

In view of prevailing practice of using pressure gun lubrication, suitable fittings must be installed on the bearings for attachment of the gun when re-lubrication is necessary. This method of pressure lubrication is accepted as being highly efficient in protecting bearings capable of retaining a grease charge without leakage. The gun must be carefully handled, however, otherwise too much grease can be forced into the bearing housing. This may readily lead to overheating, especially if the grease is too heavy, as the result of excessive internal friction within the lubricant itself. With certain types of grease, abnormal increase in temperature may cause sufficient decrease in body to result in separation of the oil from the soap, thereby causing marked reduction in lubricating value, and loss of oil by leakage if the bearing is not oil-sealed. In the variable speed transmission, this might also result in oil to drip or be thrown on to the vee-belt impairing the fabric and reducing the traction effect on the pulleys.

There is no direct method by which application of grease to anti-friction bearings can be absolutely controlled. Certain types of bearings, however, can be vented to reduce the possibility of imposing the full pressure of the lubricating equipment upon the seals; these latter must of course be maintained in suitable condition with respect to the housing if they are to positively prevent leakage of lubricant under continuous operation.

A grease for ball or roller bearing lubrication must be practically free from acid-forming tendencies if positive protection of the highly polished metallic surfaces is to be maintained. This means a virtually neutral product is required which contains no fillers. The grease must also show minimum tendency towards oxidation, decomposition, separation and development of free acidity, otherwise corrosion or pit-

(*Turn to page* 90, *please*)

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BOOM ON COSTS
SET RIVETS
FAST
2 at a time with the
Chicago
"214"
• With every press on the foot pedal the Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" or smaller steel tubular rivets, 3/4" or less in length. Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. For help with your specific fastening problem...send a sample of your problem assembly (or a blue print) for free fastening analysis.
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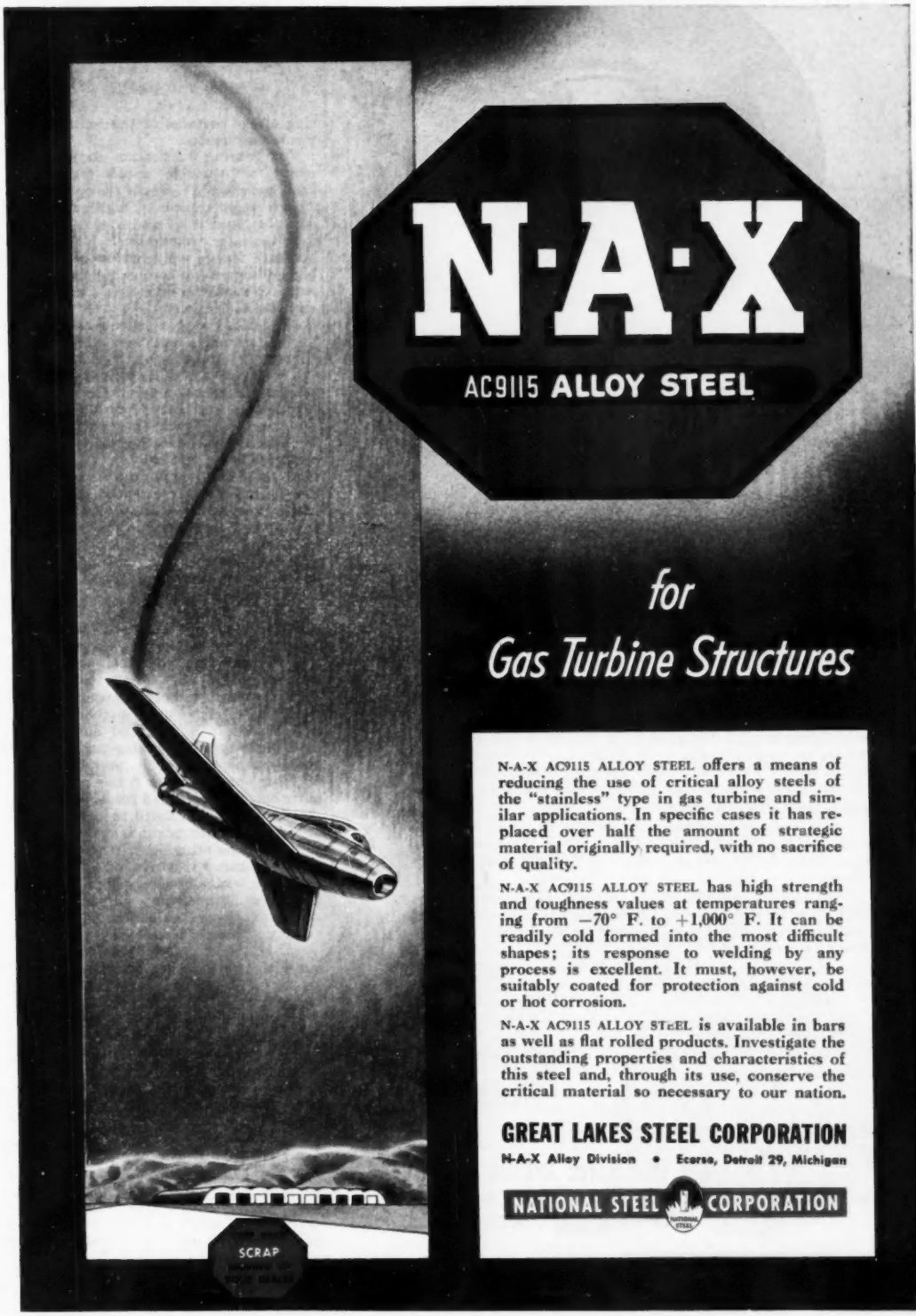
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AC9115 ALLOY STEEL
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N-A-X AC9115 ALLOY STEEL offers a means of reducing the use of critical alloy steels of the "stainless" type in gas turbine and similar applications. In specific cases it has replaced over half the amount of strategic material originally required, with no sacrifice of quality.
N-A-X AC9115 ALLOY STEEL has high strength and toughness values at temperatures ranging from −70° F. to +1,000° F. It can be readily cold formed into the most difficult shapes; its response to welding by any process is excellent. It must, however, be suitably coated for protection against cold or hot corrosion.
N-A-X AC9115 ALLOY STEEL is available in bars as well as flat rolled products. Investigate the outstanding properties and characteristics of this steel and, through its use, conserve the critical material so necessary to our nation.
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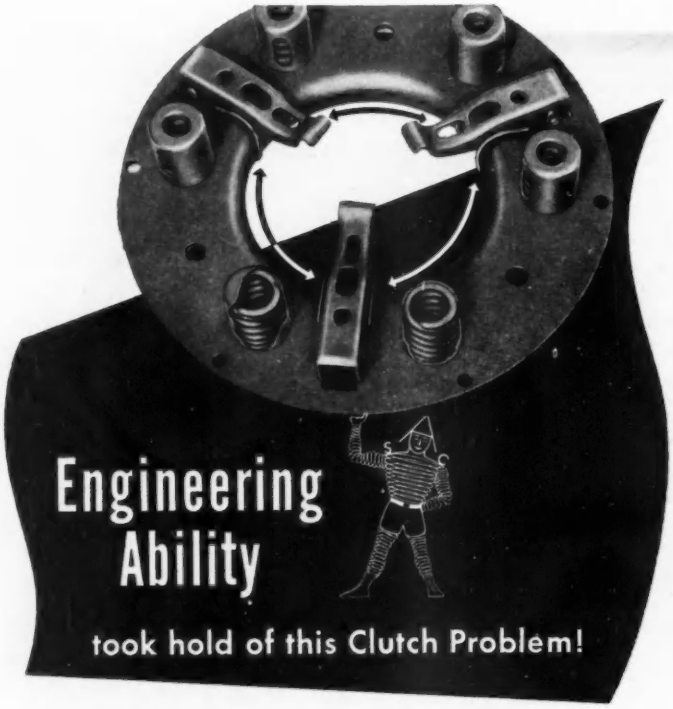


...with Springs by

AUTOMATIC SPRING COILING COMPANY

This clutch manufacturer was having a "peck-of-trouble."

The action of a lever in this particular type of clutch was such . . . that tension had to be applied in quite an unusual manner. And not only was there no standard spring to do the job . . . but also no known machine capable of turning out the necessary custom-built spring!

Then Automatic Spring Coiling Co. was called in . . . and we put *Engineering Ability* to work.

Our consulting engineers analyzed the situation . . . and designed a *special machine* to produce a special *spring* . . . which was also **Shot-peened* for fatigue strength, thereby adding immeasurably to its life potential.

Samples were made and put to repeated and conclusive tests. RESULT: More perfect clutch operation with guaranteed longer life and a considerably lessened chance for shock, slippage, vibration, grabbing and chattering.

Make it a point to consult Automatic Spring Coiling Company early in the job. Take advantage of our . . . ENGINEERING ABILITY . . . gleaned from 30 years of Precision mechanical spring specialization, and by strict adherence to Quality-Controlled standards.

**Incidentally,* "Shot-peened" *springs for added fatigue strength are among our specialties.*

Our veteran consulting engineers are ready to survey your requirements without obligation. Write us today for full details.

AUTOMATIC SPRING COILING CO.
4048 West Thorndale Avenue
CHICAGO 30, ILLINOIS

Assembly Line Lubrication

(*Continued from page* 88)

ting of the surfaces of the rolling elements may result.

For bearing lubrication in electric motor or variable speed transmission service, a grease compounded from a medium viscosity, highly refined, straight mineral oil and a soap which is suitable for comparatively high temperature service will give lowest starting and operating torque and best assurance against separation, oxidation and gum formation.

At various stages in the assembly line certain parts must be handled vertically or horizontally by the same unit. The overhead air-motor hoist is a key machine in this operation. It is used for turning over truck frames, for lowering the engines into the trucks, and for handling various other heavy parts horizontally or vertically.

At these key points on the assembly line it is absolutely essential that the hoists function dependably. Failure of one of these hoists due to faulty lubrication could easily disrupt a production schedule because the assembly line would have to be stopped while replacement or repair could be made.

In view of the vital importance of these hoists they must be properly maintained and effectively lubricated. The reciprocating type of air motor is well suited to the service involved. Four cylinder radial construction is widely used. The entire mechanism is well housed in a dust and dirt-proof case. This type of housing serves another purpose, since it prevents oil dripping onto the truck frame or other parts being handled, and thereby avoids the possibility of hazard to personnel, or oil spots which might interfere with subsequent painting.

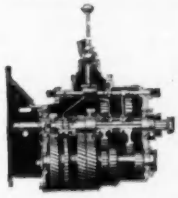
The air-motor is lubricated by splash and force feed, and a very high quality petroleum lubricating oil inhibited against rust and oxidation having a viscosity around 300 sec Saybolt Universal at 100 F is usually satisfactory under the temperature conditions prevailing in the average assembly line building.

Fittings are attached to a truck frame mostly by bolts and nuts, or perhaps by riveting. This requires the use of air-driven wrenches or riveters. Wrenches are usually of the rotary type, riveters are of percussive type.

Wrench lubrication requirements involve an oil and a grease. Vanes and cylinders usually can be operated on the same type of oil as used for the overhead hoist. In some designs the oil supply is carried in reservoirs in the tool and delivered to the air stream through a felt feeder. In others a line oiler or a combination of both may be provided.

(*Turn to page* 92, *please*)

Model 5-A-620 — one of 108 available standard Fuller Heavy-Duty Transmissions and Auxiliaries.



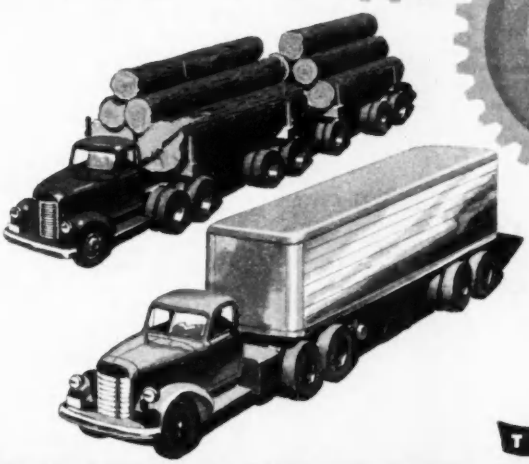
with enough gears, you can move the world

Iron ore from the Mesabi range . . . copper from the mines of Arizona . . . salt from the flats of Utah . . . coal from the pits of Pennsylvania . . . fruit and vegetables from California and Florida . . . big logs from the nation's forests . . . freight from coast to coast . . . the world's greatest transportation system constantly passes before our eyes . . . the world's most efficient trucks move over the marvels of economic history . . . the highways of America.

Leading designers, manufacturers, and operators of heavy duty trucks have worked closely with the Fuller Manufacturing Company from the very beginning of this transportation miracle—helping perfect and refine more efficient, longer lived and heavy capacity transmissions to assure every truck operator exactly the right gear ratios for his particular road and load conditions.

"*Fuller Firsts*" reflect this front-running teamwork . . . Fuller *first* to perfect a trouble-free transmission for high speed diesels; first to offer a line of auxiliaries so complete that *any* requirement could be met; first to harness up to 400 hp. in a single unit transmission; first with the revolutionary ROAD RANGER® with all ten speeds shifted by *one* lever—and no gear splitting.

Get the right gear to move *your* part of the world; the Fuller line is described in the *New* Condensed Specification Folder. Ask for it.



Fuller TRANSMISSIONS®

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

Truck Assembly Line Lubrication

(*Continued from page 90*)

In view of the use of ball bearings and gearing, the rotary vane air tool is usually designed for grease lubrication of these parts, using a high quality NLGI No. 2 grade of anti-friction bearing grease of lithium soap or mixed base (lime-soda). If such a grease is inhibited against oxidation, there is added insurance against gumming of the lubricant and sluggish action of the tool.

Considerable churning occurs when the gears in any such tool are operating. This means that fresh surfaces of grease are continually exposed to the oxidizing effect of air. Fortunately there is not too much danger of overheating in running assembly line tools as operation is on and off most of the time. While running, however, this churning can act as an accelerant to oxidation of the grease.

The means by which lubricants are applied or distributed has a marked effect upon the operation of air tools. Even the best of oils or greases may fail to do their work if they are carelessly used, or in such a manner as to be unable to reach all the wearing elements of the tools. More failures arise from insufficient or no lubrication than from any average operating condition.

The foregoing article was extracted from a recent issue of Lubrication, *published by The Texas Co.*

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Please send your Mechanical and Electrical Properties Chart to

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Special Machines

(*Continued from page 39*)

of cams. The cycle from start to finish takes but 4½ minutes, and the recording tape provides all of the information as a permanent record. Since this machine is capable of inspecting about 12 shafts an hour, it provides at least a 20 per cent sampling of hourly production and thus affords a valuable and inexpensive means of quality control.

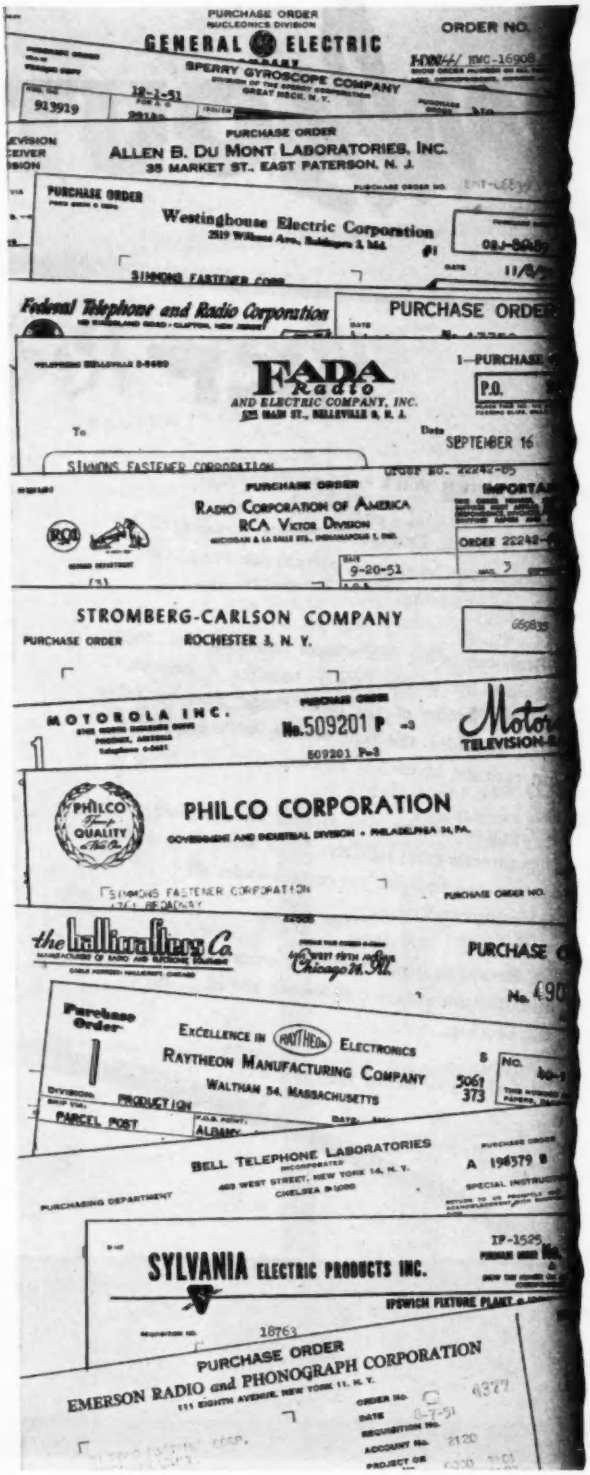
In addition, camshafts are inspected 100 per cent in a quick but sensitive air-gaging setup, employing a group of four Sheffield Precisionaire gaging machines connected to the master gaging fixture. As the work is fitted into the fixture, this provides an automatic check on straightness since any deviation would show up immediately. At the same time, the fixture has an attachment at the right hand end for checking gear fit.

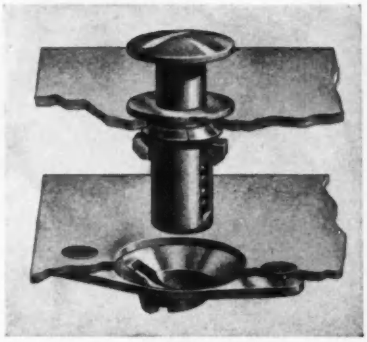
Looking at the air gages shown here, the first one, having two columns, checks the diameters at the front end. The next two air gages—each one having five columns—check the diameter of each of the five bearings at two points. The fourth air gage, having three columns, checks concentricity. An interesting point is that all of the gaging occurs simultaneously with the result that the entire operation consumes only the time required to scan the columns.

Continental Motors Reports New System on AU Engines

Continental Motors Corp.'s Air-Cooled Engine Div. recently announced that all three models of its AU series of industrial air-cooled engines are now available with a new external breaker point, condenser, and governor system which is said to combine accessibility with improved performance and service life. The unit, according to the company, consists of breaker points and fly-ball type governor driven by the camshaft and grouped with the condenser under a removable cover.

Said to double point and sparkplug life by operating at half engine speed, the unit's points and plug function only on the firing stroke.





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Faster Assembly... Better Design

Why do leading electronic manufacturers order and re-order Simmons' QUICK-LOCKS in quantity? For good dollar-wise reasons:

IN ASSEMBLY—

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- Flexible mounting takes care of curved sheets and misalignment.
- Various material thicknesses can be handled.

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- Initial loads taken by helical spring. Increased loads carried on solid supports.
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- Stud is self-ejecting when unlocked.
- Stud is self-aligning. Makes mounting and demounting detachable panels simple.

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Fasteners that improve products and reduce assembly costs.

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SKF Red

YOU CAN SEE WHY - - -

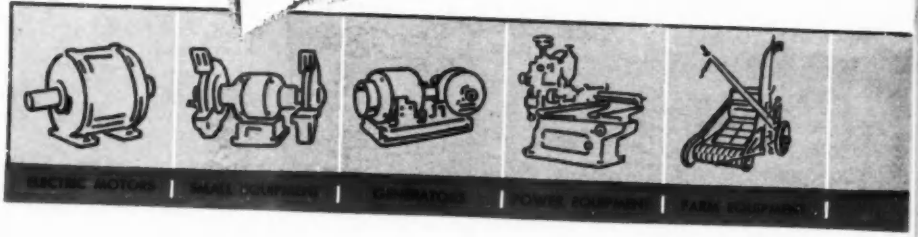
1 Seal is stable DuPont Fairprene, unaffected by petroleum-base lubricants, normal operating temperatures, or ageing.

2 Seal, extending below steel retaining ring, forms a flexible lip which lightly touches a smooth, uniform chamfer of the inner ring. This exclusive design provides effective sealing with extremely light contact, hence low friction.

3 Circular-formed ribs around the retaining rings provide great rigidity. Thus, seal contact can be light, yet certain under all operating conditions.

4 Retaining ring is staked securely during manufacture—stays put for the life of the bearing.

5 Lubricated at the factory.



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Seal bearings

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Machine designers know they are competitively priced—all are standard single-row SAE widths—all are interchangeable with conventional non-sealed bearings. Proved in service by manufacturers of electric motors, portable tools, household appliances, and other machinery where the bearings must be efficiently sealed to keep dirt out—and lubricant in. Because SKF pioneered in the sealed-bearing field—the first to incorporate effective seals within the standard SAE width bearing—designers have come to depend on this store of engineering knowledge built into each Red Seal Bearing. They know, too, that the team-work of SKF field-engineers and design-engineers at SKF's headquarters are theirs for the asking.

Write **SKF INDUSTRIES, INC.,** PHILADELPHIA 32, PA.—*manufacturers of* SKF *and* HESS-BRIGHT *bearings.*

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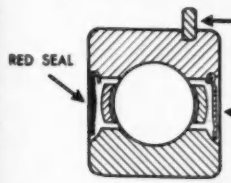
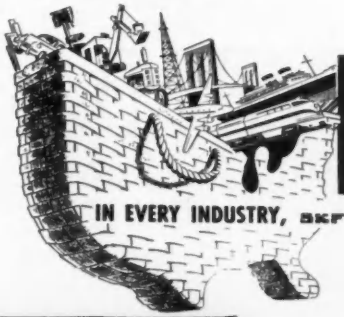
RED SEALS ARE ALSO AVAILABLE WITH SNAP RINGS AND METAL SHIELDS—ANY COMBINATION OF THESE THREE FEATURES ARE AVAILABLE





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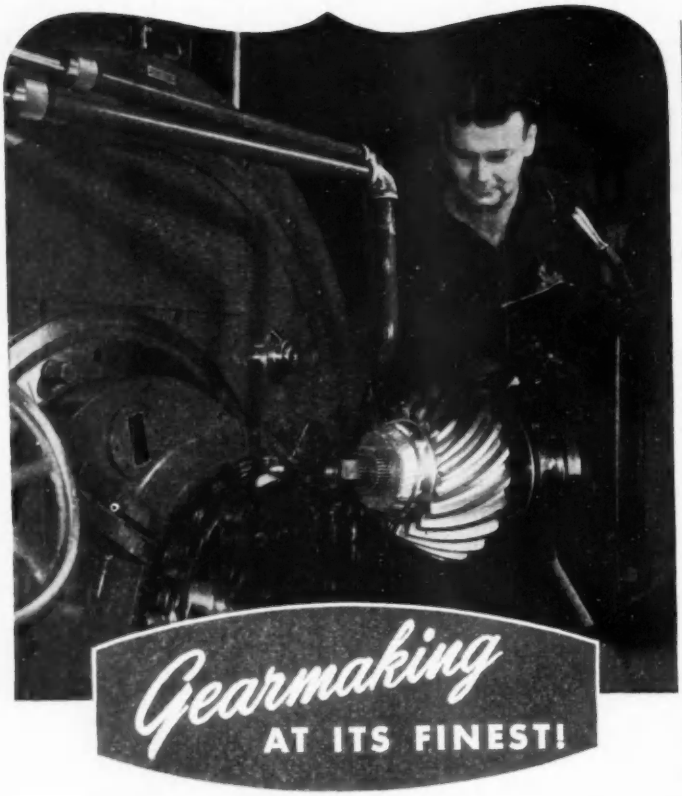

HERE "under one roof" at FAIRFIELD is *everything* needed for producing fine gears — metallurgical department, batteries of the most modern machines, testing laboratories, complete heat-treating facilities — all operated by skilled craftsmen working under expert engineering supervision. By specializing exclusively in "FINE GEARS MADE TO ORDER" for more than thirty years, FAIRFIELD has become one of America's largest producers of these parts. This is why many makers of construction machinery . . . agricultural implements . . . machine tools . . . military equipment . . . tractors, trucks, and buses now regularly depend on FAIRFIELD to meet their requirements. *For the Best in Gears, Specify Fairfield!* FAIRFIELD MANUFACTURING CO., 319 So. Earl Ave., Lafayette, Indiana.

Handling Small Castings

(*Continued from page* 50)

After considerable study, an entirely new procedure was developed which effectively eliminates manual handling, assures accurate inventories and succeeded in reducing transportation costs by better than 50 per cent. Under the new system, each class of castings is sorted and placed in specially designed steel skid boxes at the foundry for shipment by truck to the assembly plant. Here they are transferred to the receiving dock with an Elwell-Parker low lift platform truck, then tiered two high with a high lift platform truck, and transported to storage or manufacturing areas of the plant.

The special skid boxes are equipped with tiering lugs and "U" shaped legs to provide under-clearance for either platform or fork-type trucks. Angle iron bottoms make them self-cleaning and provide ventilation for hot castings. The boxes are constructed with two types of doors or gates; one has a lift-out side gate to permit easy removal of fairly heavy castings, while the other has a swing-up end-door which, when placed on a tilting rack, permits the contents to flow onto a table within easy reach of a machine operator. This latter unloading method, incidentally, increased machine productivity more than 100 per cent over the previous method where the operator was forced to reach over the side of the container.

An interesting aspect of the change from rail to truck shipment involves the design of the road trucks. The highway unit consists of a tractor and double trailer with end gates between the two trailers which let down to form a bridge, making it possible for a low lift platform truck to travel the full length of both trailers without disconnecting them.

The unloading operation is a severe one with the low lift truck handling 80,000 lb of castings per hr, 16 hr per day. In spite of the large volume, however, only about 15 min is required to unload a road unit containing up to 12 skids, as compared with several hours under the old procedure. A low lift truck is used since there is no load tiering required at this point in the operation. In addition, this type truck being lighter in weight than tiering type trucks, wear and tear on the road truck is reduced.

Obviously, the introduction of this well planned handling program for small castings involved a sizable expenditure for equipment, but the resulting savings in manpower, time and accuracy, have long since amortized the investment and are now serving to reduce the cost of the finished product.

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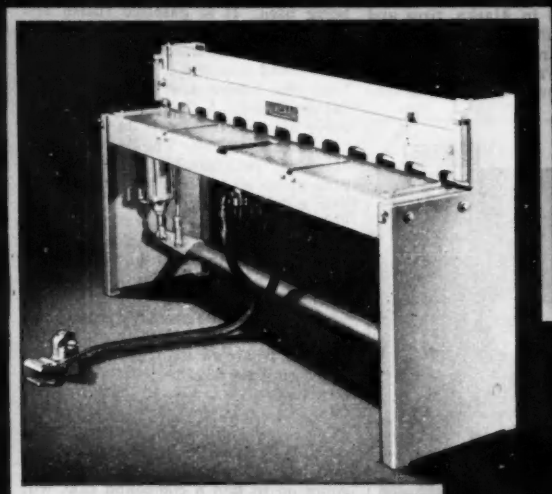
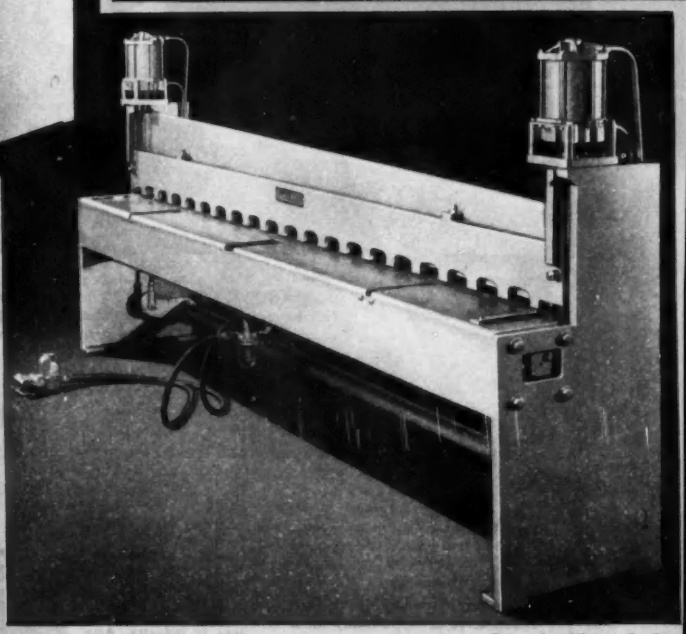
for the Thrifty Sheet Metal Shop



Capacity 16 Gage—3 ft., 4 ft. and 6 ft. Cutting Lengths.



Patented and Patents Pending

Capacity 18 Gage—8 ft. and 10 ft. Cutting Lengths.

FEATURES

- Low Initial Cost . . . Simplified Construction
- Cutting lengths ranging from 3 to 10 feet
- Capacity 16 and 18 gage mild steel
- Economical Operation
- Operates from average shop air line or a small compressor
- Flexible hose to foot treadle permits operator to trip shear from any convenient location
- One man effortless operation
- Accurate Cuts
- Unbreakable all steel construction
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Testing Automotive Equipment Under Severe Arctic Conditions

(*Continued from page* 35)

are equal to previous types.

Because of the problems relating to coolants, ATB has adopted a premixed year-round anti-freeze for use where water and ethylene glycol cannot be readily stored. It consists of ethylene glycol, di-methoxy ethanol and a corrosion inhibitor. Its freeze point is —80 F and flash point is 260 F.

Another interesting project result is a new low temperature tire, developed in connection with the rubber industry. Because of the extreme low temperatures encountered in Alaska, tires and tubes become stiff, and failures are high. The new tire remains flexible at temperatures down to —54 F, but has the same characteristics as normal rubber tires at average temperatures. Tread wear is normal and loss of air is less than with regular tires. At 21,850 miles of test, about half the tire life remained, indicating satisfactory mileage.

In the area of cold weather starting, considerable work is being done on preheating engines with an auxiliary system. One unit, developed in cooperation with Stewart-Warner, now is being used. It is gasoline fueled and operates by heating the engine coolant which then is circulated to the battery, block, and manifold. Exhaust gases from the heater are directed against the crankcase. A fiber glass insulating cover also is placed around the engine to reduce heat loss. The heater can be operated continuously to keep the engine warm all night, or be used to preheat a cold engine.

The use of external heat, sub-arctic oil, and alcohol in the fuel at the rate of one pint to about 20 gallons permits operation of vehicles in temperatures down to about —40 F, but these aids to cold starting do not fully satisfy the field forces. The problem of starting in the field, where garaging is not possible, has been partially met, but there still is considerable work to do. Another interesting cold weather problem has to do with seals. Rubber becomes stiff, causing the seal to break, with resultant leakage. Considerable research is going on to find a compound that will remain flexible and still have the required sealing characteristics. Leather and other composition seals also cause difficulty under extreme cold. One difficulty arises from condensation of moisture inside the engine, which freezes seals to shafts and other moving parts. When the engine is started after being cold-soaked for several hours, the seal sticks to the shaft and is chewed to bits.

In addition to research on operating procedures and materials, ATB has the responsibility of proving new vehicles developed by the Ordnance Corps. Newest vehicle currently under test is the Otter, an amphibious personnel carrier being built by Pontiac Motor Div. of G.M. Designated as the T-46-E-1, it has a gross weight of 12,000 lb, of which 3000 lb is pay load. Overall length is 200 in. and width is 96 in. The Otter carries a 28½ in. track with a ground contact length of 119 in. and has a ground pressure of ½ lb per sq in. Power plant is an aircooled 134 hp engine of the Ordnance family of engines developed in cooperation with Continental Motors. It has the new cross drive transmission. Engine, transmission and final drive are assembled as an integral unit and installed using three quick-detachable mountings for fast removal and service in the field. Performance data released on the vehicle include a maximum land speed of 30 mph and four to eight mph afloat. The Otter also mounts a 10,000 lb winch of the drum type at the rear.

(*Turn to page* 100, *please*)

Electrical Manufacturer says:

"Our Phillips Rotomatic Degreaser cleans more parts per hour—and saves over $150.00 per week in solvent cost"*

ENGINEERED MP SERVICE

Illustration shows the interior of the tumbling rotomatic model which performs a continuous, controlled cleaning cycle.

CLAROSTAT MFG. CO., Inc. of Dover, New Hampshire reports their new Phillips Tumbling Rotomatic Degreaser makes these specific savings in time, money and production costs*. These are three vital advantages that can't be overlooked for today's modern manufacturer who must meet the problem of rising costs face to face — and solve it!

Of course your cleaning problem may be somewhat different than Clarostat's, but the general principle is identical. We at Phillips can supply you with the right degreaser for your job—a high efficiency cleaning unit for parts of any size—simple or complex. And you will find that your cleaning costs will go down while your production goes up.

Check with your Phillips representative or write today for a complete study of your needs and recommendations to meet them — at no obligation to you. Do it today!

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Describes Phillips' complete line of products and services to industry. Also included is Phillips' comprehensive "Vapor Degreasing Handbook." Yours on request.

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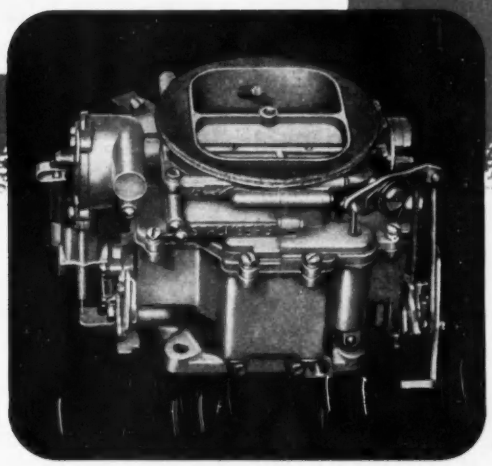
PRESENTS

Aeroquad



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Born out of Stromberg's constant search for higher efficiency in carburetion—a research program that began 40 years ago and has never since stopped nor slowed down—the new four-barrel Aeroquad Carburetor provides unequalled engine performance.

The new Aeroquad helps to provide instant hair-trigger response and acceleration when the driver demands it! It makes that extra surge of power at high speeds . . . so often needed for passing . . . a firm reality. In every driving situation—on crowded city streets . . . on fast-moving super-highways . . . under heavy load—the Stromberg* Aeroquad Carburetor gives added engine power, silky-smooth performance, and reduced operating costs.

Make your choice Stromberg—the name you can depend on for the finest in carburetion. *REG. U. S. PAT. OFF.

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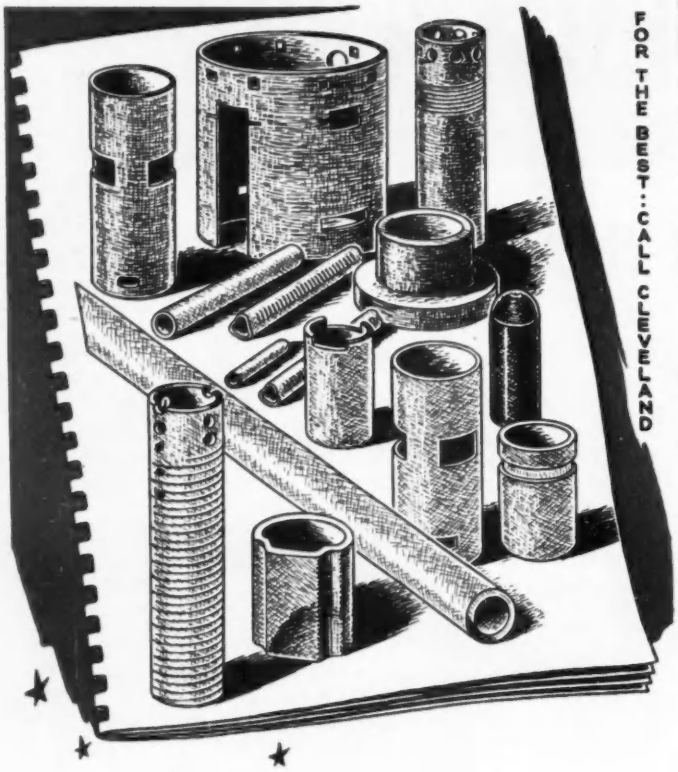

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Testing Automotive Equipment

(*Continued from page* 98)

Another very interesting activity at Big Delta is the testing of a Borg-Warner automatic transmission in World War II M29C cargo carriers, or Weasels. These vehicles were produced by Studebaker and thousands of them still are in existence. They are an important part of the Alaskan operation. The automatic drive under test is essentially the same one used in the Studebaker passenger car, with some modifications. If the tests prove successful, as now appears likely, it is indicated that many of the Weasels now in use and stored at arsenals about the country may be converted to the B-W direct drive.

A Canadian snowmobile also is being put through its paces at Big Delta. It is powered by two Cadillac engines coupled with a Hydramatic transmission. The tracked vehicle is said to perform extremely well in snow because of its high flotation. It presumably is being built by one of the General Motors Canadian operations.

Buick Expanding Facilities For Power Steering

Buick Motor Div. of General Motors Corp. has revealed that production of cars with power steering is running approximately 35 per cent of Road master output. Facilities for production of power steering units are reportedly being doubled at the present time, but they will not be completed for several months.

Mercury Cars Assembled at Lincoln Plant in Detroit

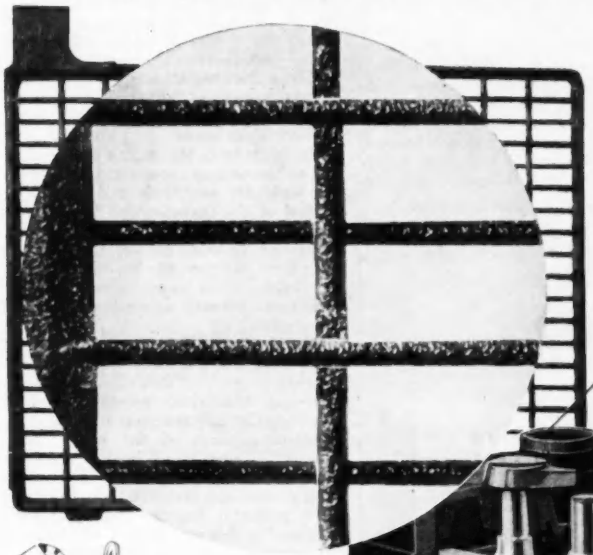
Lincoln-Mercury Div. of Ford Motor Co. stated recently that for the first time in its history Mercury cars are being produced at the Lincoln plant in Detroit, Mich. Mercury assembly is being carried on, the company said, without interference with Lincoln production and will continue until the new plant at Wayne, Mich., is completed. Both cars will then be produced there

Towmotor Corp. Sales Reached High in 1951

According to its recent annual report, net sales of Towmotor Corp reached a new high in 1951 of $24,658,984, an increase of 70 per cent over ne sales of $14,540,822 in 1950. Due to in creased production and labor costs ant taxes, however, there was a drop in ne profit to $1,279,719 from $1,305,882 ir 1950.

Globe-Union Grids

help make your customers "battery happy"



"NONSPILL" safety vents prevent acid spilling over—protect adjacent vehicle parts.

FLEXIBLE, rubber-mounted posts absorb shock, prevent battery leakage and snapping of terminals.

GLOBE-UNION GRID features combine to assure longer plate life and high battery capacity. They are cast from pure, laboratory-checked lead and are scientifically alloyed with antimony for rugged durability. *V-shaped interlocking construction* holds active material more securely. *Pebble coating* of grid bars provides a stronger bond with the super-active oxides. *Life-lengthening balance* is built in by giving extra thickness to the positive grids. Corrosion is minimized because virtually *all* of the grid is covered with active material. The *tougher, stronger* Globe-Union grid maintains a uniform flow of current through the mass of active oxides.

If it's engineered and made by Globe Union—it's RIGHT FROM THE *START*

HIGH-POROSITY separators permit quick release of power.

CHEMICALLY SET plates promote more power, prolong battery performance.

Globe-Union builds quality batteries for original equipment and for mass merchandising under the trade names of GLOBE SPINNING POWER and leading private brands.

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10,145 Jet Engines

(*Continued from page* 45)

reinforced concrete made from a special aluminous cement capable of withstanding exhaust blasts which send cell exhaust gas temperatures to 1000 F in eight sec.

Air enters an engine undergoing test at 100 mph and is exhausted at 1300 to 2000 mph. From the engine it is directed to a cylindrical augmenter which carries the exhaust gases to the stacks. One section of the pre-cast exhaust stack consists of the aluminous cement blocks which are designed to take out low frequency sound waves. High frequency waves are absorbed by stainless steel and spun glass batts located at both the air intake and exhaust ends of the test stand. The 114-ft long cells are equipped with carbon dioxide systems which can immediately flood the engine test area in case of fire. Pressure relief hatches are provided in all areas where necessary. Control rooms are completely isolated from the test cells. Data taken during production tests include fuel flow, oil flow, air flow, thrust, pressures and temperatures, and speed of rotating parts.

There is one control room that is suspended on a cushion of rubber and is completely surrounded by a blanket of air to minimize the possibility of instrumentation errors through vibration and to reduce engine sound. This room serves adjacent "super-cells" where new experimental engines are put through their paces.

Running from the engine in the test cell to the control room are 460 electrical leads for electronic and electrical control of the turbojet and for special instrumentation. The special instrumentation includes devices to measure the flow pattern of hot gases and clearanceometers which record various clearances between operating parts of the engine.

Also fed into the control room from the engine are 200 pressures, such as air, hot gases, fuel and oil. Temperature indicating and recording apparatus reports 200 temperatures, including temperatures of the metal, air, fuel and lubricating oil in the turbojet.

The massive test cells served by the control room are designed to handle far more powerful engines than any yet produced in this country. Test engines are supported far off the floor by a cradle and are surrounded by catwalks which provide access for test personnel.

According to the announcement concerning the new J47-GE-27, it will be used to power the latest North American F-86F Sabre fighter and a similar version will power the Navy's FJ-2 Fury, also a product of North American. Both of these planes are in the 650 mph class. The "27" engine is now in production at the G. E. Lynn plant and soon will go into manufacture at Lockland.

This new turbojet has about 10 per cent more thrust than former J-47's exclusive of afterburners. Increased thrust is said to be mainly attributed to improved accessories, an improved fuel system, and an increase in airflow along with a pressure increase in the engine. The pressure increase is due to the longer blades in the first stage of the compressor. Along with the thrust gain, the "27" is also said to have an improved specific fuel consumption. Another improvement is that the cross-fire tubes are considerably shorter than in previous models.

On the subject of new engines, Under Secretary of the Air Force, R. L. Gilpatric, stated, "Indeed, there is presently under development here at Lockland a turbojet engine that may well lead the way into the realm of supersonic propulsion." It was not stated whether this new engine would be the experimental J-73, J-53 or another of G-E's developmental turbojets.

(*Turn to page* 105, *please*)

Proved PERFORMANCE

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

During normal times and emergency times — for the past 36 years — Lamb Electric Motors have had an outstanding performance record in many motor-driven products.

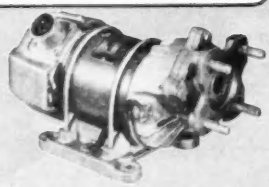
Behind this good performance is the fact that Lamb Electric Motors are *specially engineered* to provide the exact mechanical and electrical requirements for each product they drive.

Other advantages often obtained are reduced *product* weight, compactness, and lower cost.

THE LAMB ELECTRIC COMPANY • KENT, OHIO

THEY'RE POWERING AMERICA'S Finest PRODUCTS

Having inbuilt control switch and receptacle, this motor is readily adaptable to portable tools and equipment.

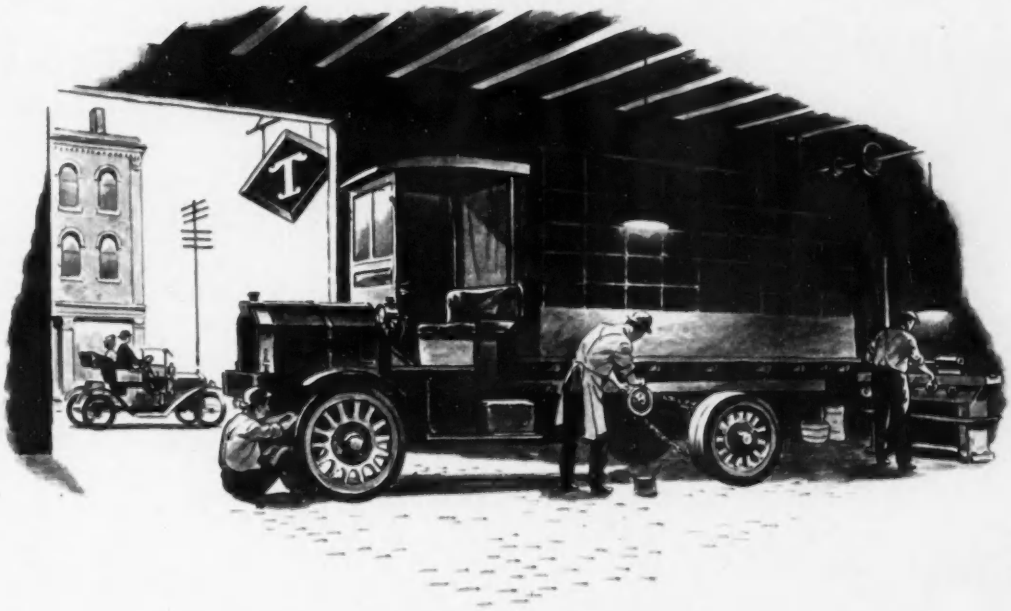


High powered lightweight helical geared fuel transfer pump motor for aircraft and other services.

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER **MOTORS**

Spicer

SPECIALISTS IN SERVICE



We were there...

and we still are there! The first shipment of Spicer Universal Joints to the Diamond T Motor Car Company, Chicago, was made in 1907. Today, in 1952, Diamond T still is using Spicer Universal Joints ... a 45-year record of *continuous* service and satisfaction with a product that has now become world famous. Spicer has grown up with the automotive people, and since 1904 has introduced many new and revolutionary power transmission units that have become the Standard of the Industry.

Spicer

SPECIALISTS IN SERVICE

Nearly 50 years of service on the world's toughest jobs

Spicer *looked ahead* in 1904 when it introduced the first successful universal joint for automobiles.

Spicer has *always looked ahead* . . . continually developing universal joint refinements that have anticipated new needs in automotive service.

Spicer *is ahead today* . . . with outstanding design features in its flange- and yoke-type line of universal joints . . . with a greater number of units in service than any other make . . . and with an unequaled performance record of nearly a half-century in all types of vehicles on all types of duty.

SPICER MANUFACTURING
Division of Dana Corporation • TOLEDO 1, OHIO

48 YEARS OF **Spicer** SERVICE

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

(*Continued from page* 102)

During the anniversary ceremonies, Charles E. Wilson, Director of Defense Mobilization, stated that during 1952 the production of aircraft must double, and by the end of 1952 the production of jet planes must be 2½ times what it was at the beginning of 1952. According to Mr. Wilson, our production of airplanes in February was at the rate of 60 per cent of our scheduled peak production, in numerical terms, which we will reach at the beginning of 1953. He pointed out that problems posed by the aircraft program are dramatized by the instance of the new forging and extrusion presses required for turning out the airframes of jet bombers and fighters. There will be 17 of these presses of varying sizes and the largest one—a 50,000 ton unit, according to Mr. Wilson, will be as tall as a nine-story building.

Lt. Gen. E. W. Rawlings, Commanding General, Air Materiel Command, USAF, disclosed that the face value of current Air Force contracts with G-E is close to $1,386,000,000.

Trade Situation of Motorcycle Industry Remains Under Survey

Investigators at the U. S. Tariff Commission are reported to be continuing their study, begun in mid-1951, to determine whether the nation's motorcycle industry faces collapse because of inequities of reciprocal trade treaties.

Most recent charge that the industry is "reduced to the point of extinction" was made on the Senate floor by Sen. Alexander Wiley. Describing a conversation with officials of the Harley-Davidson Co. and the United Auto Workers, Wiley said the company's plight is so grave it may have to choose between a complete shut-down and a switch to a different product line.

Harley-Davidson, according to Wiley, produced more than 90,000 military motorcycles for the U.S. and friendly governments during World War II. Now, he said, the firm is unable to ship its products to any British Commonwealth nation "because the various governments will not issue import permits."

Wiley contended that the motorcycle company is not the sole victim of competition with devalued foreign currencies and products of low-paid labor abroad, but that its situation is the most serious. For that reason, he has urged the Tariff Commission to recommend that the "escape clause" be invoked to reduce the pressure placed on Harley-Davidson by extensive imports of foreign-made machines.

YOUR JOB IS CLEAR
—GET IN THE SCRAP
to keep steel coming

NON-FERROUS SCRAP *is needed too!*

a cost reducing exercise

SIMONDS ABRASIVE CO.
Grinding Wheels

Trim your grinding costs! Get your department in shape for maximum output. Set-up with Simonds Grinding wheels. They're fit for the grind whether it's rough snagging, micro-inch finishing, cutting-off, shaping, polishing or sharpening . . . accurately specified in a complete line including grinding wheels, mounted wheels and points, segments and abrasive grain . . . and backed by Simonds' 60 years of 'know-how' as a major producer of grinding wheels and abrasive products. Write for free data book and name of your distributor.

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ASTE 1952 Meeting
Outdoes Former Events

(*Continued from page* 43)

The process differs from drilling in that a cylinder of metal is removed by the tool. The central portion of metal in the hole is removed as a solid core after the operation is completed. Thus it is not necessary to convert all the metal in the hole into chips.

Mr. Lucht said the process, which employs ultra-hard carbide tools, has been applied successfully to producing deep holes in high alloy as well as conventional steels.

He also forecast that the process could be applied successfully to the production of parts for civilian goods since the economies of the process are just as applicable to shallow as well as deep hole production. If used for such parts, he said, production costs would be reduced and accuracy increased.

In closing, Mr. Lucht suggested the following items be considered as critical when setting up a new trepanning job:

(1) The machine must be rigid, have a variable speed motor within the required range and plenty of power available.

(2) The trepanning head drive tube is well supported.

(3) The trepanning blades are sharpened properly.

(4) Plenty of cutting fluid is used.

(5) The chips are broken up small.

(6) The microstructure and hardness of the work material is properly maintained.

(7) The job should be supervised by a well trained carbide engineer on a project basis.

Broaching of Internal Gears

Use of the broaching process to produce teeth on internal gears instead of conventional gear generating methods is already cutting industry machine tool requirements and conserving factory floor space badly needed for defense expansion programs, according to J. A. Psenka, Engineer for National Broach and Machine Co., Detroit.

He also revealed that large savings in capital outlay as well as savings in direct labor, maintenance and tool sharpening have resulted from using the broaching process to produce internal gears.

Mr. Psenka told about a plant which has been able to produce internal gears for 5000 transmission units a day with only five broaching machines. He said that conventional generating and finishing methods would have required a total of sixty-four machine tools.

According to Mr. Psenka, the savings in tool cost alone on this job amounted to $250,000 on a total yearly production of 2,500,000 gears. He said that the gears produced by the broaching process passed rigid inspection requirements and gave excellent service in the field. An additional advantage was that because of the focusing of attention on the proper care and handling of the internal gear broaches, total broaching costs per piece on all other broaching operations in this particular plant went down relatively as unit tool costs went up on drills, reamers, milling cutters etc.

Sound testing room rejections, and field complaints due to internal gear noise was virtually eliminated.

Electronics in Motor Drives

The needs of industry for versatile machine tools that can get top performance from modern fast cutting tool materials are now being met by drives controlled by electronic devices according to E. H. Vedder, Manager of the Industrial Electronics Section, Westinghouse Electric Corp., Buffalo, N. Y.

Mr. Vedder said that electronic con-

(*Turn to page* 108, *please*)

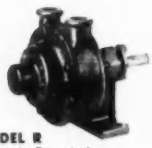
SURE CURE
for Pump Headaches.....

Specify TUTHILL PUMPS
for LUBRICATION
COOLANT
FUEL and LIQUID TRANSFER
HYDRAULIC MECHANISMS

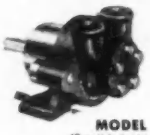
MODEL C
(General Purpose)
For use with non-corrosive liquids. Low cost, low maintenance. Compact. Capacities to 200 g.p.m. and pressures to 100 p.s.i. Direct drive or belted units.

MODEL CK
(High Pressure)
Compact, ball-bearing pump in capacities up to 50 g.p.m. and pressures to 400 p.s.i. Direct drive or belted units.

MODEL M
(Coolant)
Has built-in automatic by-pass for protection against excessive pressure; also compensates for wear. Capacities to 50 g.p.m.



MODEL R
(Automatic Reversing)
Delivers from same port regardless of direction of shaft rotation without check valves. Capacities to 200 g.p.m.



MODEL L
(Small Industrial)
Mechanically sealed for leak-free service and low power consumption. Capacities to 3 g.p.m. and pressures to 600 p.s.i.

Write for Tuthill Pump Guide to help you select the exact pump for the purpose, whether it be for replacement or a new application on original equipment.

25 TUTHILL PUMPS FOR THE WORLD'S HYDRAULIC NEEDS Anniversary

TUTHILL
Pump Company
939 East 95th Street, Chicago 19, Illinois

Conestoga Wagons had POWER STEERING... Why not Modern Trucks?

Thousands of these sturdy wide-wheel wagons carried freight between the Atlantic Coast and Pittsburgh, the gateway to the "Ohio country", in the 1830's and 40's. The driver rode the left wheel horse and did not steer by muscle power. He signalled the left lead horse with a single rein . . . shouted "gee" and "haw". If a wheel hit an obstruction or a softer spot than usual, the horsepower took care of it . . . not the driver's back and shoulders. Flat tire trouble was eliminated by having them all flat (iron) in the first place.

The ordinary modern motor truck is far superior to the Conestoga in every way except steering. In eliminating the 6-horse teams with jingling bells, we have loaded the work of steering on the driver himself. Without power steering he has to expend physical effort that at times would have daunted even the rough and ready Conestoga men. Drivers tire, slow down, become less efficient . . . more prone to have accidents.

When equipped with Vickers Hydraulic Power Steering, the heaviest truck can be steered under even the most adverse conditions (ruts, soft shoulders, flat tires, etc.) with only a light finger touch on the steering wheel. Drivers remain fresh, efficient, safe. Get additional information by asking for Bulletin M-5100.

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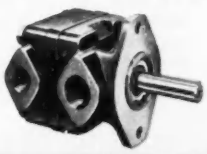

VICKERS hydraulic POWER STEERING Is Effortless, Positive and Shockless

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here's a savings
we KNOW
you can make

Any manufacturer driving Heli-Coil inserts manually — in metals, plastics or ceramics — can reduce the time and cost of this operation as much as 80% . . . we know, because we're doing it every day in our own plant!

How? By replacing manual operation with the faster, more efficient operation of a Buckeye air tool. You'll find Buckeye air tools are compact and lightweight, easy to handle in any driving position, and require far less maintenance . . . we know, because we build them!

If you're driving Heli-Coil inserts by hand, we'll be pleased to show you how — and how much — a Buckeye air tool can save on this work . . . then you'll know, too!

Buckeye Tools
CORPORATION
DIVISION 21 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

ASTE Meeting

(*Continued from page* 106)

trols permit a machine tool to be operated over a wider range of speeds. They also permit automatic variations in speed of the machine while actually cutting. This permits cutting tools to operate at constant cutting speeds regardless of variations in diameter of the work, he added.

Simple types of fully electronic controls for machine tools cost less, in drives under five hp, than other types that permit similar adjustable speed characteristics, Mr. Vedder said. One reason that electronic drives have come to the forefront in machine tool designs today is that they work best at high speeds, and most machine tool builders are developing high speed equipment to meet high productivity levels demanded by industry.

Summing up the advantages of electronic functions in filling certain needs in motor drives, Mr. Vedder listed the following:

(1) More accurate control of speed either by counter emf or tachometer feedback regulation.

(2) Speed control in pendant stations.

(3) Current or time limit acceleration as part of electronic system used basically for other reasons.

(4) Extremely wide speed ranges.

(5) Lower cost in ratings below three to five hp.

Forming of Flat Sheet Metals

The forming of parts from flat sheets of metals is the most difficult and unpredictable of all die operations. Even with the best possible draw die design, the first sample panels of a difficult draw are often very discouraging looking, with waves indicating local areas of excess metal, or tears indicating stretch beyond the yield point of steel. This was brought out by Charles R. Cory, Engineer in Charge of Die Engineering for the General Motors Fisher Body Division, Detroit.

The question of whether a drawn steel shape like a body panel can be produced as the stylist wants it, he said, depends on the characteristics of the steel sheet from which it is formed. It must neither wrinkle nor tear in being formed.

In these days of uncertain steel quality and scarcity of deep drawing steel, die designers have to limit the shape of drawn parts to avoid wrinkles and tears in the material, Mr. Cory said.

He said that in manufacturing a body panel, the size of the sheet steel blank that is to be formed to shape in a drawing die is determined by the number of perfect panels that can be produced with commercially available steel. There is always scrap to be

(*Turn to page* 110, *please*)

YOUR C-D-F SALES ENGINEER

is a good man to know!

Here's the man trained to solve your materials specification problems in plastics. He knows what's new with C-D-F and how *you* can use the service proved C-D-F non-metallic materials.

The way he sells is to help you . . . his wide technical background in the electrical and mechanical industries helps you avoid design pitfalls, can point out production shortcuts; that's why you should call him in when a new product is on the board.

Under his hat and in his case is the information you must have to meet competition and to build a better product. Backed up by the practical experience and research of C-D-F's six plants, it's no wonder it makes common sense to see the man from C-D-F (Sales offices in principal cities). *He's a good man to know.*

ACROSS THE BOARD
C-D-F plastics have special characteristics, can meet close tolerances, rigid specifications. Learn the facts, get the complete story from the man from C-D-F.

OVER THE DESK
When talking prices and delivery, you get action, not promises. The C-D-F salesman takes a personal interest in your problems . . . "follows through" on your order.

IN THE SHOP
Whether it's our plant or yours, here's a man with a quick eye for cutting costs, improving quality. Years of practical training plus imagination=Your C-D-F salesman.

CDF

Continental-Diamond Fibre Company
NEWARK 2, DELAWARE

ASTE Meeting

(*Continued from page* 108)

trimmed from the drawn shape, he added, but any wrinkles or tears in a panel scrap the entire panel. If steel sheet quality is not consistent, unpredictable scrap production can occur in excessive amounts.

New Concept in Metal Removal

The possibility that further studies of methods of changing the energy of atoms in metals may revolutionize present methods of machining was forecast by K. R. Blake, Vice-President and Consulting Metallurgist, Metalloid Corp., Huntington, Ind. He told the assembled production experts that the use of cutting fluids capable of yielding atomic elements could permit major increases in cutting speeds, increases in tool life of from 400 to 800 per cent; and greatly increased machineability of "hard to machine" metals. Principal requirements would be that the atomic element liberated from the cutting fluid should be useable to increase the atomic energy of metals at the point of rupture. Any increase in such atomic energy within the metal would greatly improve its machineability.

According to Mr. Blake, the theory which he calls "Dynatomics" also explains many of the formerly little understood phenomena in metal cutting.

Screw Machine Tooling

Automatic screw machine tools can be made to produce from ten to twenty times the pieces per hour they are now turning out if carbide tooling is utilized to its fullest extent. This claim was made by C. R. Morgan, Consulting Engineer for Cone Automatic Machine Co. of Windsor, Vt.

According to Mr. Morgan, this tremendous increase in machine productivity, with resultant decrease in need for scarce machine tools, can be accomplished by applying carbide tooling in a planned program that involves the tool engineer, shop foreman, tool grinder and the machine operator.

Necessary for this program are only minor improvements in machine tools, plus improved tool designs, tool holders and machine accessories, Mr. Morgan said.

In an actual example cited by Mr. Morgan, production time was cut from 90 to 15 seconds per piece on an automatic screw by simply applying carbide tooling concepts. Another example was a plant where 60 automatics formerly were required for production requirements; 40 machines are doing more work today, and if a complete change-over had been realized, twenty more could be discarded.

Mr. Morgan pointed out that automatic loading devices will become necessary when the productivity levels he envisions are reached. He said that with these high production rates, must come new developments in inspection equipment and methods to assure that the parts made at such speeds will also be accurate.

Dr. James V. Strela, Staff Statistician for Thompson Products, Inc., Cleveland, Ohio, told production experts that the special "pinball" machine has the same variables as production operations: the machine, the material (represented by steel balls) and the operator (represented by an electric motor drive).

The pinball machine has a bin of steel balls above a motor-driven wheel. The latter feeds one ball at a time into 21 rows of pins. Under the pins are 39 channels into which the balls fall by chance. The balls can pile up in any of the channels and thereby give a visual picture or "score" of the accuracy to be expected when varying quantities of samples are checked.

"Tilting" of the pinball machine, called the "Quincunx" by Dr. Strela, gives results identical with those obtained in production machining operations where something has gone wrong.

In his talk, entitled "Statistical Evaluation of Rational and Stratified Meth-

(*Turn to page* 114, *please*)

Twice the Work of a Work Horse

Twice the Speed of a Race Horse

The Crosley FarmOroad "goes to town" plowing, harrowing, cultivating, mowing, raking and numerous other farm jobs — then carries the family and produce to town quickly, comfortably and economically. ROCKFORD CLUTCHES contribute to the sturdy dependability of this versatile unit. Let ROCKFORD clutch engineers help with your power transmission control problems.

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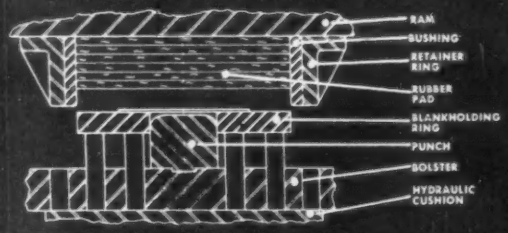
B-W ENGINEERING MAKES IT WORK

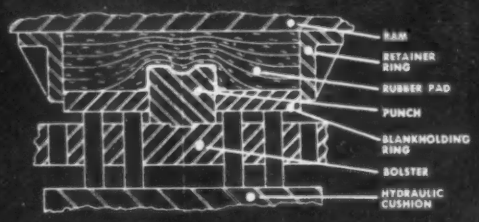
B-W PRODUCTION MAKES IT AVAILABLE

ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

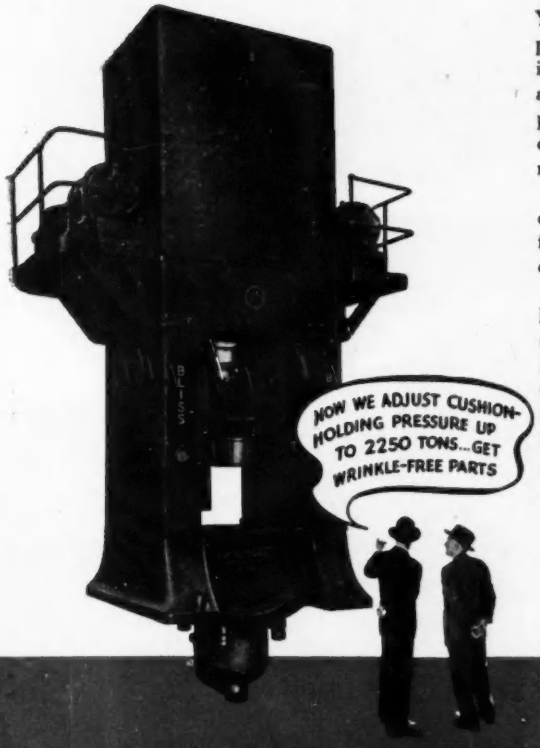


Rubber-pad draw die in open position on a single-action press with cushion: To provide higher pressure, pad area is decreased by inserting a bushing inside rubber retainer ring.



A double-action rubber-pad die in closed position: The high pressures, which rubber pad withstands, make possible production of reverse curves (like that at top of punch).

Deep, Complex, Wrinkle-free Shapes through Rubber-Pad Press Forming



You can now have short-run production of deep-drawn parts through rubber-pad forming—with substantial savings in tooling time and costs. Required heavy pressures are delivered by single and double-action hydraulic presses with a holding cushion in the bed and rubber pad on the slide. Compared with drop-hammer methods, the rubber-pad process offers a *better product at less cost.*

Airframe manufacturers, after experimenting with the double-action type of rubber die work, report pressures from 1500 psi to 4000 psi. In some instances pressures of 15,000 psi on the rubber itself are found desirable.

Highly versatile Bliss Hydraulic Presses with blank-holding cushions built into the bed and cushion capacities up to about ninety percent of the press rating, are available in a wide range of sizes. Flexible pressure controls to suit the work range are furnished. The rubber pad and retaining ring of suitable dimensions may be ordered with the press. Submit samples or part prints. Bulletin 39 gives a description of the process.

E. W. BLISS COMPANY, CANTON, OHIO

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Presses, Rolling Mills, Special Machinery

From the right press for a given job... to a complete press room... **It's Bliss!**

700-Page Handbook Tells How to Use Presses Efficiently

Bliss Power Press Handbook, 450 illustrations. Sections on: Easy methods of computing press jobs • How to select proper press • Engineering tables • Die illustrations • Glossary of terms. Plus service section on all Bliss presses. Price $7.50

E. W. Bliss Company—Handbook Dept., Canton, O.

View of V-8 engine line, Studebaker plant, South Bend, Ind.

STUDEBAKER

chooses *Life-Line* motors for *dependability*

Studebaker V-8 engines get their start here. This machine, half a city block long, takes rough cast cylinder heads at one end, turns out completely machined and drilled finished ones at the other—at a rate of 150 finished cylinder heads per hour.

It's no accident that the motors that power this machine are Westinghouse Life-Lines. In fact, most motors that power the equipment at Studebaker are Westinghouse motors. This type of machine must meet one basic requirement—SHUTDOWN TIME IS OUT. One motor outage may cause the stoppage of the entire line. Thus, when motors were selected, Life-Lines were chosen because of their high degree of dependability.

This dependability is not based on any one feature. Rather, it is the sum of the parts—all based on advanced Westinghouse engineering. Pre-lubricated bearings, all-steel construction, superior insulation are typical of the factors that add up to the facts. You can't beat Life-Line performance. This dependability is yours at no extra cost.

Find out for yourself how Life-Line motors have solved problems for others. Send for a copy of "101 Life-Line Case Histories" B-4769. It's free. Your Westinghouse representative has one for you, or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

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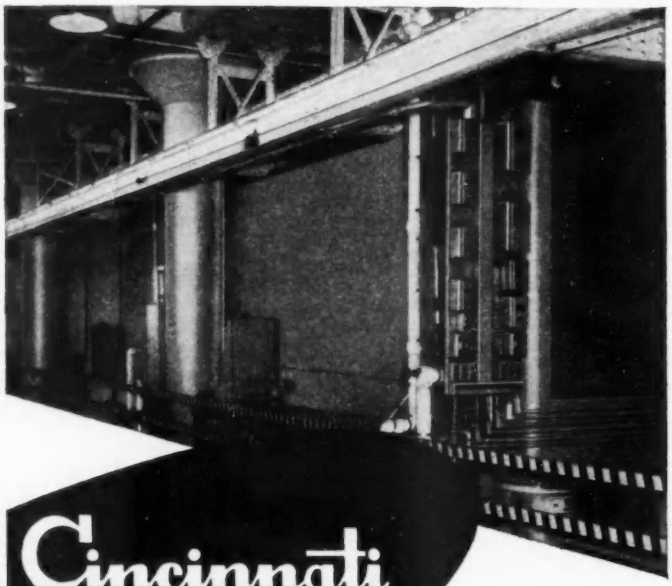
Westinghouse

Life-Line

MOTORS and CONTROLS



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CLEANING
MACHINE

processes 8 TONS of parts
daily for leading
electrical manufacturer

An extremely wide variety of formed metal panels are cleaned in General Electric's Philadelphia plant by this Cincinnati designed-and-built machine. Miscellaneous steel and aluminum panels, at the rate of 225 tons a month, receive six stages of treatment: alkali wash, two rinses, phosphate coat, rinse, chromic rinse and air dry. In addition to time and labor savings, better pre-finish cleaning is obtained, reports this well known manufacturer.

A cleaning machine engineered by Cincinnati to save time, labor and materials . . . yet assure better results . . . can be designed to meet your particular requirements. For additional details or a no-obligation survey of your cleaning problems, call in a Cincinnati engineer.

Catalog available on request.

Cincinnati

CLEANING & FINISHING MACHINERY CO., INC.
315 HECLA STREET, IRONTON, OHIO

ASTE Meeting

(*Continued from page* 110)

ods of Sampling," Dr. Strela said that the pinball machine proved that mathematical analyses were usually 99.73 per cent correct.

Fixed Gages

Low cost gages of standard types are now in tremendous demand for our current rearmament program, according to William H. Gourlie, Standards Engineer at the Sheffield Corp., Dayton, Ohio. He said that plug gages, ring gages, snap gages, contour gages and the many other types of gages which are embraced in the general grouping of fixed gages, are a vital and essential part of our overall program to control quality. As a functional check, as a means of assuring assemble-ability, fixed gages have done in the past, are now doing, and will in the future do an excellent job. When quantities are limited and where tolerances are moderate or liberal, fixed-type gages may cover requirements adequately.

Mr. Gourlie said that the need for conventional manual gages has not been eliminated by the latest designs of automatic, mechanical, electrical and air gaging equipment which now make direct measurements and show when machine tools should be adjusted to produce accurate parts.

There are many parts still produced by industry that can only be successfully inspected by fixed gages, he pointed out. Particularly is this true of screw threads where so many variables occur that old fashioned thread ring and plug gages of the fixed type are still the best answer, he said.

On the other hand, however, Mr. Gourlie explained that these remarks are not intended in any way to belittle instruments and indicating type gages. They too are an important part of our overall program to control quality. They can be of tremendous help in high-production manufacture. Instrument gaging is required for the high degree of precision called for in some of our finer mechanisms. Instrument or indicating type gages are especially helpful when used right at the machine. They show the operator when a tool change is necessary before out-of-tolerance parts are machined. They show when a machine adjustment is needed and the amount of that adjustment.

YOUR JOB IS CLEAR
—GET IN THE SCRAP
to keep steel coming

NON-FERROUS SCRAP is needed too!

KELSEY-HAYES

MOST ADVANCED *Feather Touch* PASSENGER CAR

POWER BRAKING

FOR EFFORTLESS, SAFER BRAKE CONTROL!

Right or Left Foot Braking!
BRAKE
THROTTLE
New accelerator-type low brake pedal operates the easiest and safest way imaginable!

. . . Thanks to Kelsey-Hayes Superior Vacdraulic Power

Kelsey-Hayes "Vacdraulic", already standard equipment on over 100,000 passenger cars made by one of the world's three largest automotive manufacturers, is today's most advanced power braking development.

Kelsey-Hayes "Vacdraulic" unit utilizes complete hydraulic control with a fixed reaction ratio which powers the brake action instantaneously, with a perfect "feather-touch" control, assuring perfect "pedal feel" in direct proportion to the pressure applied.

That's why more and more car manufacturers consider "Vacdraulic" the safest unit, particularly for passenger cars following the new trend to the much lower, faster, accelerator type of brake pedal.

(Have Kelsey-Hayes engineers give you convincing proof of "Vacdraulic's" superiorities)

K-H ASSURES PROVEN PRODUCTS AT

KELSEY-HAYES WHEEL COMPANY

DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.

PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

The BUSINESS PULSE

(*Continued from page* 52)

lend another withdrawal by labor from board membership. Mr. Wilson qualified his statement by declaring that it had only been an expression of personal opinion. Congress is considering an inquiry into the operations of the board and may decide to strip it of its jurisdiction in non-economic disputes. If this is done, it is thought probable that the labor members will withdraw. Thus, the future of the board and of the stabilization program as a whole has been brought into question.

Deficit Spending

Early in March the President asked Congress for $7.9 billion in new spending authority for the Mutual Security Program. This represents the difference between the $10.5 billion which the Administration proposes to spend on foreign aid in fiscal 1953 and the amount of unused authority it expects to have left over at the end of the current year.

Of the $10.5 billion, which is equivalent to one-eighth of the entire Federal budget, about $8 billion is for the delivery of military equipment to friendly nations, while about $2.5 billion is to be used for economic aid and technical assistance.

The Administration contends that this sum is essential for international security and is well within our economic capacity. The President, together with other Governmental officials who have testified before Congressional committees holds that any reduction in the amount would be false economy and would endanger the national security.

It is evident, however, that many members of Congress feel that the foreign-aid program, on the scale proposed by the President, itself endangers the national security. The prospect of a cash deficit next year of $10 billion, most of which would probably have to be financed by the inflationary expansion of bank credit, has led them to challenge Mr. Truman's contention that present plans are within our capacity. Many of our legislators apparently question the wisdom of expending funds to bolster foreign economies if in so doing we jeopardize the financial stability of our own. Their desire to minimize the deficit has brought a large number of members to the conclusion that the foreign-aid total, along with other items, must be reduced.

Most members appear willing to authorize a substantial part of the military aid that has been requested. Hence, it seems likely that the board category of economic aid will bear the brunt of any cutting that occurs. At this point it is generally thought the Administration will do well to hold the trimming to $1 billion.

Imports Rise

An interesting development occurred in foreign trade in January. Exports, which had been climbing sharply in the final quarter of 1951, dropped by $200 million below the December total. At the same time, imports rose by more than $100 million. The result of these cross-tendencies was a sharp reduction of our export surplus, marking a reversal of the trend which prevailed during most of 1951. The export surplus for January amounted to $325 million, as compared with the very high total of $636 million in December.

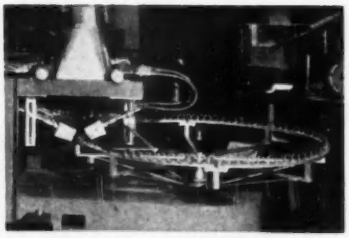
This is significant because of the close relation which existed between the widening of our export surplus last year and the payments difficulties experienced by many foreign nations. The rest of the world as a whole sold over a billion dollars' worth of gold to

(*Turn to page* 118, *please*)

FOR
Faster Localized Heating
The **ZIG-ZAG** *Burner*

For
FLAME HARDENING
FLAME ANNEALING
HEATING AND BENDING
BRAZING
PREHEATING
SPOT HEATING

The ZIG-ZAG HIGH SPEED GAS BURNER is revolutionary in design—doing the job better and faster—doing jobs that could not previously be done economically with gas.
ZIG-ZAG's concentrated heat output provides extremely fast heating, resulting in better hardness patterns in flame hardening and less scale in all heating operations. The burners are ruggedly built for long life. Equipment cost is very low when compared to the furnace setups they usually replace. For your localized heating applications — for speeding up your production — find out NOW about the ZIG-ZAG Burner!



Silver brazing small parts on G.A.S. Turntable unit with ZIG-ZAG Burners.

NOTE: ZIG-ZAG Burners are available individually or can be furnished as part of a complete heating unit designed for your particular operation.

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Industrial Gas Engineers
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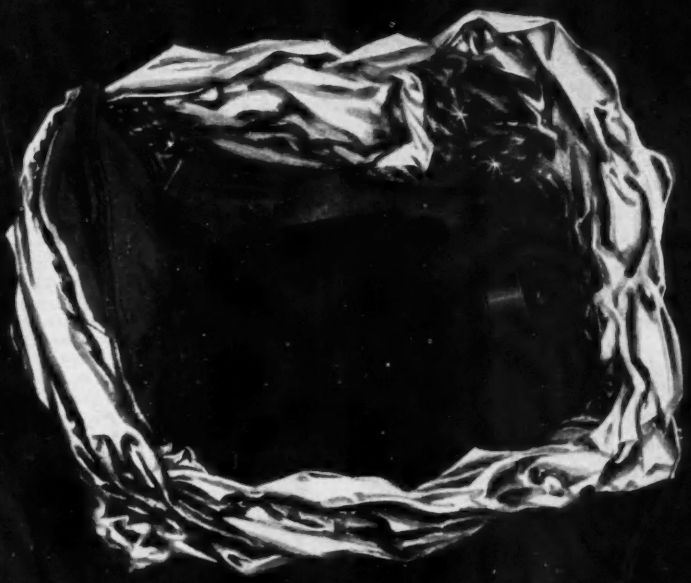


SPARKLING

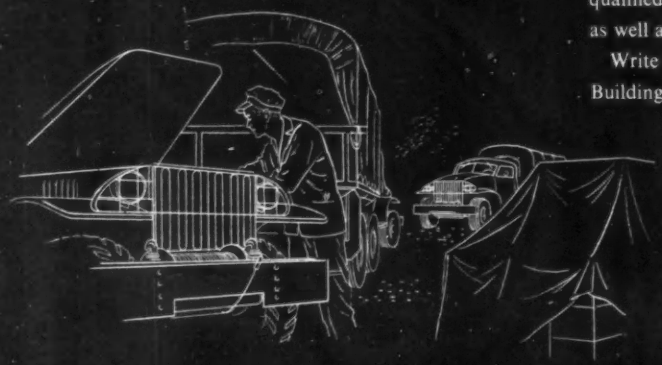
ALCOA Foil keeps it dry

When it's needed, this military replacement motor will be ready. Alcoa Aluminum Foil, laminated to other materials, keeps it dirt and moisture free, *ready at the drop of a hat.*

Today, shipment and exposed storage of defense equipment emphasize the remarkable, protective qualities of this sparkling, pure aluminum wrapping . . . qualities already familiar to many industries whose peacetime uses of Alcoa Foil have placed it high on the list of preferred packaging materials.

If you have a packaging problem, consider the many advantages and possible applications of Alcoa Foil. While it is true that current supplies are limited by military needs, we will gladly send you the names of packaging experts, qualified to give you information on material availabilities, as well as capable assistance in your future planning.

Write to: ALUMINUM COMPANY OF AMERICA, 1764D Gulf Building, Pittsburgh 19, Pennsylvania.

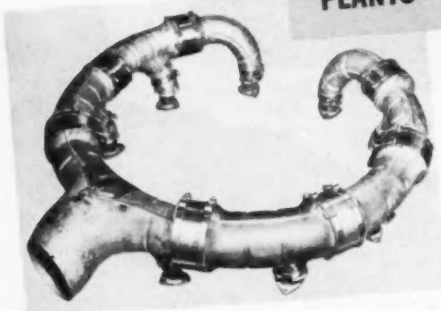


ALCOA

ALUMINUM

ENGINEERS NOTEBOOK

POWER PLANTS



Multiple Take-up Clamp Simplifies Shroud Connections

The collector ring of the Piasecki HUP-1 helicopter is shrouded to insulate the structure from heat produced by the buried engine. Marman multiple take-up clamps provide a simplified means of coupling the titanium shroud sections together. A very slight modification of a standard clamp design was employed to accommodate this specialized application. Clips were spot-welded to the edge of the clamp, enabling it to apply a coupling action in addition to the clamping action usually associated with this type of clamp. This clamp brings about significant savings in weight, cost and time of assembly and disassembly. The patented T-Bolt latch assures a vibration-proof positive seal at all times.

Save Time, Weight, Money with Marman

FOR INFORMATION AND LATEST CATALOG, WRITE DEPT. A-4

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MARMAN PRODUCTS CO., Inc.
940 W. FLORENCE AVE.
INGLEWOOD, CALIFORNIA

BUSINESS PULSE

(*Continued from page* 116)

this country during the second half of 1951 in order to settle obligations. This drain on foreign reserves was the prime reason for the numerous additional restrictions which were placed on imports of dollar goods abroad. The narrowing of the trade gap in January suggests that these restrictions are beginning to affect our export trade. In addition, it is quite possible that foreign purchases of United States raw materials for inventory building have begun to taper off. Since there are indications also that United States imports of raw materials have been running below current production for some time, a further narrowing of the trade gap would not be surprising.

Tank Plant

(*Continued from page* 34)

which have been or will eventually be put into action, include Cincinnati milling machines, Morris radial drills, Kearney & Trecker horizontal milling machines, Bridgeport boring mills, Blanchard grinders, Giddings & Lewis drilling and milling machines, Gray vertical boring mills, etc.

Details of many of the new machining operations and assembly techniques which will be employed, have not been disclosed since the manufacturing facilities of the plant are not officially open.

The building itself is 600 ft wide and 1480 ft long. This does not include a steel open craneway 80 ft wide, which extends more than 500 ft to the rear of the building. The craneway will be used for handling and storage of heavy tank components. Besides the assembly line and machinebays, the manufacturing area contains three engine test cells. These cells will be used for inspection testing only. Engines for the tanks will be shipped from Chrysler's new engine plant in New Orleans. They will be of the new 810 hp air-cooled type.

There are separate buildings for painting and final adjustment and repair. The paint shop is designed for through passage of tanks by a conveyor system, and will provide complete facilities for cleaning and final interior and exterior painting. Adjacent to a one-mile, figure eight, test track is the final adjustment and repair building; this facility will be used during and after testing on the run-in track. The test track contains no obstacles since it is for inspection run-in only.

When the new Delaware plant is finaly readied and placed in full production, there will be about 3000 workers, some 600 machine tools, and approximately 10,000 fixtures, gages and other productive tools employed to fabricate and assemble T-43 and T-48 tanks.

BALL bearings are necessarily made to close tolerances which apply not only to the balls and races but also to the retainers which must have exact dimensions and shapes. This matter of retainer quality has been given careful study by the Stephens-Adamson Mfg. Co., Aurora, Illinois, maker of the well-known SealMaster Industrial ball bearing units. The company collaborated closely with the Revere Technical Advisory Service in working out the specifications and forming procedures for its brass retaining rings. As a part of this joint activity, Revere made a full survey of Stephens-Adamson requirements, with the object of standardizing and simplifying specifications for the benefit of both the engineering and the purchasing departments. The success of this work is indicated by this statement from the Superintendent of SealMaster bearing production: "First and foremost, I am pleased with the uniformity of gauge and temper of the Revere brass we have been receiving. This uniformity makes it possible to produce ball retainers of very close tolerance, with a minimum of rejections and at comparatively low unit cost. Furthermore, I have appreciated the dependable delivery service and the cooperation of the Revere organization."

In these times of scarcities, when it is more than ever necessary to reduce waste and save metal, you may wish to take advantage of Revere's skill and know-how in non-ferrous metals. Just get in touch with the nearest Revere Sales Office.

ABOVE, the largest retainer made for a SealMaster industrial ball bearing unit, contrasted with the smallest block and retainer.

BELOW, three of the steps in retainer production: blanked, formed and punched, and assembled part ready to receive the balls.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

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Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities. Distributors Everywhere

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Defense Contract Awards

This latest list of defense prime contracts that have been awarded covers the period from Feb. 8 to Mar. 24. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

Unit quantities and dollar amounts are given for contracts from $25,000 to $250,000. Contracts above $250,000 are indicated by "over $250,000," but their actual dollar amounts and unit quantities are not available.

—A—

Accurate Truck Parts Co., Chicago 16, Ill.
Repair parts—130 line items—$62,142

Engineered by
BORG & BECK®
means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!
YOU CAN DEPEND ON
BORG & BECK®
CLUTCHES . . . FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD
Reg. U.S. Pat. Off.
BORG & BECK CLUTCH THE STANDARD
BW
BORG & BECK DIVISION
Borg-Warner Corporation
CHICAGO 38, ILLINOIS

ACF Brill Motors Co., Phila., Pa.
Repair parts—224879—$803,089

Active Gear Co., Inc., Chicago, Ill.
Tank & combat vehicle parts—700—$68,586

Adel, Gen. Metals Co., Burbank, Calif.
Pump assy.—various—$46,500

Air Associates, Inc., Teterboro, N. J.
Cap, fuel tank filler—1888 ea—$39,912

Airborne Instr. Lab., Inc., Mineola, N. Y.
Indicator kit—$500,000

Aircooled Motors, Inc., Syracuse, N. Y.
Misc. spares—$50,000

Airesearch Mfg. Co., Div. of the Garrett Corp., Los Angeles, Calif.
Turbine & cooler assy.—60 ea.—$35,937
Maintenance parts—$53,797
Spare parts—$151,852
Spares for turbine assys.—$105,811

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Spare parts—various—$34,000

Alloy Products Corp., Waukesha, Wisc.
Cylinder assy.—740—$136,900

American Airmotive Corp., Miami Springs, Fla.
Observing domes—1550—$41,075
Aircraft parts—$26,167

Auto Car Sales & Service Co., Los Angeles 7, Calif.
Repair parts—236 line items—$23,437
Repair parts—228 line items—$49,494
Spare parts—74 line items—$11,180

American Fabricating Co., Detroit, Mich.
Tank & combat vehicle parts—1500—$32,925

The Armstrong Rubber Co., West Haven, Conn.
Tires & tubes—over $250,000

Aviation Engr. Corp., Woodside, L. I., N. Y.
Instruments—various—$67,549

—B—

Baldwin-Lima Hamilton Corp., Hamilton, Ohio
Repair parts—39473—$320,156

Beech Aircraft Corp., Wichita, Kans.
Aircraft—$1,000,000

Bendix Aviation Corp., Pacific Div., N. Hollywood, Calif.
Elevation cylinder assy. over $250,000

Bendix Products Div., Bendix Aviation Corp., South Bend, Indiana
Spare parts—$43,758
Wheel assy.—$17,094
Wheel & brake assy.—$1,031,792

Bendix Westinghouse Automotive Air Brakes Co., Elyria, Ohio
Repair parts—151 line items—$12,594

Chas. Beseler, Newark, N. J.
Spare parts—$42,279

(Turn to page 122, please)

One of the many types and sizes of McClintock pans

How McClintock pans are used in modern markets

SMOOTH way to do a SMOOTH JOB

McClintock Manufacturing Co. of Los Angeles manufactures an extensive line of metal platters and pans used by up-to-date markets for the display of meat. For space in the cabinets, the pans must be rectangular; for sanitary reasons they must be one-piece and perfectly smooth. And they can't cost too much, either.

In the picture you see how McClintock uses a Clearing hydraulic press in drawing these pans. Automatic sequence control simplifies operation and delivers maximum production. Cushion pressure is accurately regulated, and the result is a smooth piece smoothly produced every time.

Whether your metal forming problem is like this one, or entirely different, Clearing engineers can help you. Clearing makes both mechanical and hydraulic presses to fit virtually any production requirement.

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

HAMILTON DIVISION, HAMILTON, OHIO

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

for exacting requirements

Pierce Production Facilities Can be Valuable to You

The Pierce-built precision instrument, shown above, regulates the flow of fuel to combustion chambers in America's finest turbojet aircraft engines.

It is a sensitive, compact, centrifugal-hydraulic control system with valve tolerances as close as 1/30,000th of an inch. Performance requirements demand flawless workmanship and quality control of the highest order.

Pierce facilities and experience are available to you . . . in the manufacture of high production small mechanical assemblies (machine work and assembly) . . . precision machining of mechanism castings . . . and fabrication of small stamped parts and assemblies.

Your inquiry will receive immediate attention. Write to Chief Production Engineer,

The **PIERCE**
GOVERNOR CO., Inc. Box 1000, Anderson, Indiana

"WORLD'S MOST EXPERIENCED GOVERNOR MANUFACTURER"

Contract Awards

(*Continued from page* 120)

Bower Roller Bearing Co., Detroit 14, Mich.
Hardware—51800 ea.—$85,276

Breeze Corp., Inc., Newark, N. J.
Actuator, shaft indicator assy.—$34,835
Ignition, harness assy.—108—$88,452

AFC—Brill Motors Co., Phila. 42, Pa.
Trailer—over $250,000

Brono New York Industries Corp., New York, N. Y.
Wattmeter—$437,750

The Buda Co., Harvey, Ill.
Spare parts—various—$40,000
Spare parts—various—$52,000

The Budd Co., Detroit, Mich.
Motor vehicle parts—10700—$89,666

Buescher Band Instrument Co., Elkhart, Indiana
Altimeter—11704—$750,000

—C—

Carlisle Corp., Carlisle, Pa.
Tires & Tubes—4900—$83,888

Carter Carburetor Corp., St. Louis 7, Mo.
Spare parts—54 line items—$10,251

Charles W. Carter Co., Los Angeles 21, Calif.
Automotive repair parts—33 line items—$11,624
Automotive repair parts—410 line items—$26,138

Caterpillar Tractor Co., Peoria, Ill.
Spare parts—various—$100,000
Spare parts—$39,000
Spare parts—
Spare parts—various—$120,000
Spare parts—various—$52,000
Spare parts—various—$43,000
Tractor—14 ea.—$156,000

Chanslor & Lyon Co., Los Angeles, Calif.
Repair parts—35 line items—$14,881

Chevrolet Motor, 2-234 General Motors Div. GMC, Detroit, Michigan
Motor vehicles—26250 ea.—$252,201
1000 ea.

Chrysler Motors Cal., Los Angeles, Calif.
Wing Flaps—$587,000

Chrysler Corp., Detroit, Mich.
Tank, T48—over $250,000

Civilian Bldg. & Supply, Inc., Fort Wayne, Indiana
Aircraft apparatus—$32,239

Clark Cable Corp., Cleveland 3, Ohio
Tank & combat vehicle parts—3930 ea.—$25,477

Clark Equipment Co., Battle Creek, Mich.
Spare parts—various—$34,202
Repair parts—191 it—$28,761

Columbia Geneva Steel Div., U. S. Steel Co., Pittsburgh, Calif.
Hardware—1666752 lbs.—$94,588
26043 shts.

Cons. Vultee Aircraft Corp., San Diego, Calif.
Kits—$112,234

(*Turn to page* 124, *please*)

FOR FREEDOM TO THRIVE

FRICTION MUST STAY THROTTLED

It's a terrifying vision . . . to imagine how swiftly friction, if left unbridled, could bring about the disintegration of our Nation's freedom and economy. But it could not happen.

Take, for example, *mental* friction. How long could peaceful minds remain untainted, how long could our liberty survive if America should once drop its guard against subversive influences and fail to succeed in stemming the Communist tide?

Or take, for example, *metal* friction. How long could America produce the things that keep us free and mighty, should friction ever be allowed to freeze the wheels of industry? Without bearings America would be without hope.

The Aetna Ball and Roller Bearing Company is vigilantly alive to its responsibilities as one of the leading suppliers of the anti-friction products so essential to the Nation's vital civilian and military equipment builders. It will continue to direct the results of its best thinking, best experience and best craftsmanship toward further improvements in its service to these indispensable industries. For upon them the security of our nation largely hinges.

Aetna

AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue • Chicago 39, Illinois

In Detroit — Sam T. Keller — 2457 Woodward Avenue

BALL AND ROLLER BEARINGS • MISCELLANEOUS PRECISION PARTS

Defense Contracts Awards

(*Continued from page* 122)

Continental Aviation Engineering Corp., Detroit 14, Mich.
Maintenance parts—various—$242,738

Continental Motors Corp., Muskegon, Mich.
Spare parts—various—$42,713

Cooper Tire & Rubber Co., Findlay, Ohio
Tires & Tubes—4000—$560,920
Tires & Tubes—over $250,000

E. L. Cournand & Co., Inc., New York 34, N. Y.
Parts, aviation—226 ea.—$73,902

The Crescent Co., Inc., Pawtucket, R. I.
Motor vehicle parts—15350—$49,120

James Cunningham Son & Co., Rochester, N. Y.
Tank & combat vehicle parts—1804—$208,212

ORIGINAL EQUIPMENT ON MANY LEADING CARS AND TRUCKS

DOLE

Thermostats

Thermostat Suggestion:

To Automotive Engineers—

- Remember that Dole Thermostats are different in principle and performance.
- It was the advent of the new Dole Thermostat that made feasible the smaller radiators and the sealed cooling systems.
- Dole Thermostats are designed to give top performance on the new cars with high pump pressures.
- Plan and specify Dole Thermostats for both today's cars and those on your drawing boards.

THE DOLE VALVE COMPANY

● CONTROL WITH DOLE

● 1901-1941 Carroll Avenue, Chicago 12, Illinois
Philadelphia • Detroit • Los Angeles

—D—

Dana Corp., Toledo, Ohio
Spare parts—$28,828

The Dayton Rubber Co., Dayton, Ohio
Tires & tubes—over $250,000

Denman Rubber Mfg. Co., Warren, Ohio
Tires & tubes—2850—$149,739
Tire—2352—$123,750
Tires & tubes—4350—$172,695

Douglas Aircraft Co., Inc., El Segundo, Calif.
Dispensers—$111,582

Douglas Aircraft Co., Santa Monica, Calif.
Maintenance parts—over $250,000

Duebel Art Tool & Mach. Co., Detroit 6, Mich.
Tank & combat vehicle parts—200 ea.—$56,172

Dumont Aviation Associates, Long Beach, Calif.
Aircraft generators—$43,400

—E—

Eastern Rotocraft Corp., Willow Grove, Pa.
Swash plate exciter—$24,845

Eclipse — Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Indicator—4857—$743,512
Indicator—1961—$124,763
Automatic pilot—$4,575
Spart parts—$50,865
Oxygen regulators—over $250,000
Case—10880 ea.—$25,786
Generators—1460—$696,740
Indicator—5073—$310,681
Indicator—8461—$484,507
Fuel flow indicator—$203,073
Maintenance parts—469—$39,719
Maintenance parts—various—$36,212
Kit—1200—$75,024

Thomas A. Edison, Inc., West Orange, N. J.
Panel assy.—200 ea.—$30,470

The Electric Auto-Lite Co., Toledo, Ohio
Gage—9565 ea.—$89,720

—F—

Fairbanks Morse Co., Chicago 5, Ill.
Spare parts—various—$26,500

Fairchild Aircraft Div., Fairchild Engine & Airplane Corp., Hagerstown, Md.
Aircraft—$79,000

Federal Aircraft Works, Minneapolis, Minn.
Ski assys.—10—$75,635

Federal Motor Truck Co., Detroit, Mich.
Parts—58 line items—$11,882
Motor vehicle parts—2611—$25,595

Firestone Tire & Rubber Co., Akron, Ohio
Recoilless rifle—over $250,000

Fletcher Aviation Corp., Pasadena, Calif.
Fairing assy.—$88,176
Tank assy.—$3,331,250

Flex-O-Tube Meridan Corp., Detroit, Michigan
Hose assy.—$71,234

Ford Motor Co., Dearborn, Mich.
Engines—$20,000,000

Fort Wayne Truck Parts & Equipment, Inc., Fort Wayne, Indiana
Repair parts—150 line items—$26,285
(*Turn to page* 128, *please*)

Rolled bronze bushings, cast bronze bushings and precision bronze parts, produced in hundreds of designs, to many alloy specifications and in a great range of sizes. Use our specialized facilities—capacity now available.

FEDERAL-MOGUL

FEDERAL-MOGUL CORPORATION, 11037 SHOEMAKER, DETROIT 13, MICHIGAN

FEDERAL Mogul SINCE 1899

Your greatest automotive

1. DESIGN SAVINGS

Doing everything possible to meet original customer specifications is a Bundy *must*. Yet Bundy engineers can often point out design improvements and fabrication savings. Above: vent tube, as specified, for use inside gasoline filler tube. Problem was to remove possibility of gasoline entering two side vents as gas tank was filled.

Above: Improved design suggested by Bundy engineers completely protects vent from gasoline entry by baffle deflection. More, this part requires just two operations: one to flatten end and pierce tube simultaneously, one to put double bend in flattened end. For customer, new design meant better function at lower part cost.

Bundyweld Tubing®

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Presto . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge, 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Philadelphia 3, Penn.:* Rutan & Co., 1717 Sansom St. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 4755 First Ave. South *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 881 Bay St. • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

tubing buy on every count

You buy unmatched tubing features, priceless safe performance, *plus* cost-paring engineering skills when you specify Bundyweld Tubing.

You get *more* for your tubing dollar when you specify Bundyweld for automotive fuel lines, oil lines, hydraulic brake lines.

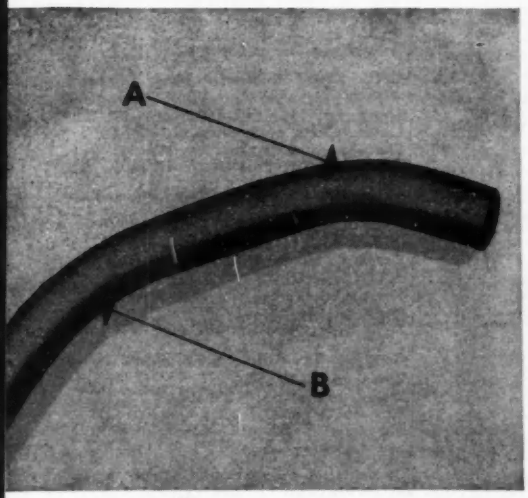
You buy unequalled tubing features. Bundyweld is the only tubing double-walled from a single strip, copper-brazed through 360° of wall contact. It's leakproof, highly resistant to vibration fatigue, lightweight, yet stronger.

You buy tubing performance that has made Bundyweld a byword for safety and dependability, proved by the 360,000 miles of Bundyweld used in cars, trucks and buses since 1930.

More, you buy the industry's finest skills and services. Bundy engineers help you work out the easiest, most economical way to produce new tubing parts; often save money by showing you how to use less tubing, how to make production short cuts. If you wish, Bundy will take over complete fabrication of your tubing parts — produce them as specified, deliver them on time.

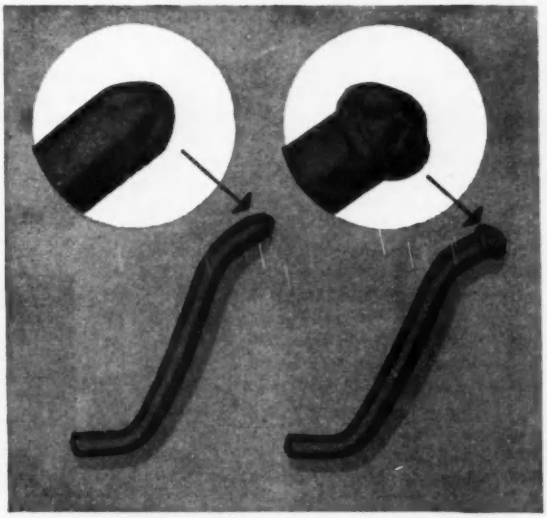
Whether you prize safe performance or cost-cutting engineering skills, specify Bundyweld . . . and you'll buy both.

Contact a Bundyweld Distributor (listed lower left), or write direct to *Bundy Tubing Company, Detroit 14, Michigan*



2. COST SAVINGS

Bundy engineers are always on the lookout for new ways to shave costs. For example, the 7/16"-O.D. oil tube shown above required two bends, yet both ends had to be held to exact size. The nearness of Bend A to the end of the part made holding of exact size difficult. Bundy engineers went right to work on the problem, came up with *results*: bending and sizing were combined in one press operation for high-volume production, lowered costs. Specify Bundyweld and you tap engineering skills dedicated to paring costs, whether you fabricate tubing parts or Bundy fabricates them for you.

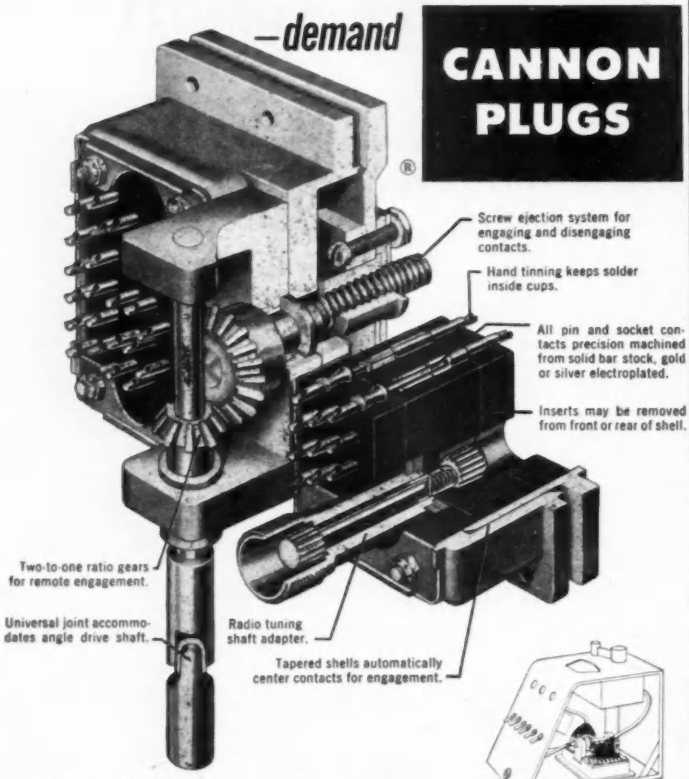


3. FABRICATION SAVINGS

The 3/16"-O.D. timing-gear oiler tube shown above required tapered end for a nozzle effect. As specified by customer (left), it required numerous swaging operations. With customer's consent, Bundy added upset to nozzle tip (right). As a result, nozzle-forming operations were cut in half. But Bundy bird-dogging didn't stop there. Two hand-bending operations were incorporated into one automatic press operation. The over-all result: impressive fabrication savings to the customer, with no compromise in tubing function.

Here's why those in the know

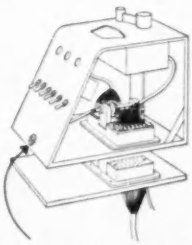
—demand CANNON PLUGS®


Screw ejection system for engaging and disengaging contacts.
Hand tinning keeps solder inside cups.
All pin and socket contacts precision machined from solid bar stock, gold or silver electroplated.
Inserts may be removed from front or rear of shell.
Two-to-one ratio gears for remote engagement.
Universal joint accommodates angle drive shaft.
Radio tuning shaft adapter.
Tapered shells automatically center contacts for engagement.

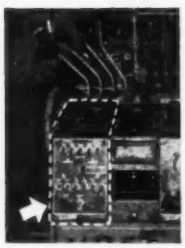
This highly specialized DPD2 Cannon Plug, a member of the DP Series, has its principal use in aircraft instrument panels and remote radio control equipment. But, like many other Cannon Plugs, it has found its way into other fields where the highest quality is needed and where the value of long, trouble-free performance is recognized.

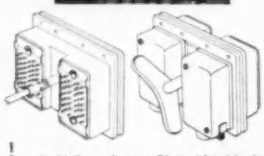
Originally this 2-gang connector was designed to assist in the standardization of radio and instrument assemblies so that such equipment might be interchanged between similar aircraft. It allows for compact design in close quarters with access from the front only. This type of application and variations of the fittings are shown at right. Any Cannon DPD insert may be placed within the shell, with or without tuning shaft, coax, twinax, large or small contacts, provided the separation forces of both halves are similar.

This plug typifies the close attention to important detail that distinguishes every Cannon Plug—the world's most extensive line. If you are looking for real value, regardless of the field you work in, your best bet is Cannon.



Connector is separated by turning slotted shaft here. Complete unit may then be removed from pedestal, shown below.





(Left) Same Cannon Plug without tuning shaft. Straight drive instead of 90° gear. (Right) Similar DPD2 with Dzus wing nut extraction method and junction shells. There are several other variations. Write for details.

CANNON ELECTRIC

Since 1915

CANNON ELECTRIC COMPANY
LOS ANGELES 31, CALIFORNIA

Factories in Los Angeles, Toronto, New Haven. Representatives in principal cities. Address inquiries to Cannon Electric Company, Dept. D-126, P. O. Box 75, Lincoln Heights Station, Los Angeles 31, California.

Contract Awards

(*Continued from page* 124)

—G—

General Electric Co., Schenectady, N. Y.
Spare parts—$2,848,818
Generator—5707—$140,597
Indicator—4296—$76,272
Flap indicators—$48,555
Frequency motors—310—$45,229
Tachometer—$76,166
Generator—2698—$79,927

General Engineering & Design Co., Detroit, Mich.
Tank & combat vehicle parts—2740—$92,886

George K. Garrett Co., Philadelphia, Pa.
Aircraft hardware—$704,220

Gates Rubber Co., Detroit 2, Mich.
Tires & tubes—1600 ea.—$160,336
Tires & tubes—4250—$217,600

General Electric Co., Phila., Pa.
Turbo supercharger—4 ea.—$26,424

General Metals Corp., San Francisco, Calif.
Repair parts—19826—$136,129

General Motors Corp., Electro-Motive Div., La Grange, Ill.
Repair parts—26125—$38,505

General Motors Corp., Oldsmobile Div., Lansing, Mich.
Rocket assy.—over $250,000
Rocket assy.—over $250,000

GMC (Truck & Coach Div.), Pontiac, Michigan
Motor vehicle parts—19000 ea.—$31,920
Motor vehicle parts—4600 ea.—$61,410
Engines—
Metal parts for rocket—over $250,000

Gibbs Mfg. & Research Corp., Janesville, Wisc.
Spare parts—10 ea.—$174,664

The B. F. Goodrich Co., Akron, Ohio
Wheel assy.—$194,957
Track assy. for tank—over $250,000
Brake assy.—174 ea.—$82,584
Tube assy.—3804 ea.—$80,474

Goodyear Tire & Rubber Co., Akron, Ohio
Wheel assy.—$45,649
Wheel, brake assy.—$51,491
Tire—504 ea.—$47,271
Hardware—609000 lbs.—$142,749
Shoe, brake—8200—$40,001

Gramn Trailer Corp., Lima, Ohio
Semitrailer—10 ea.—$60,264

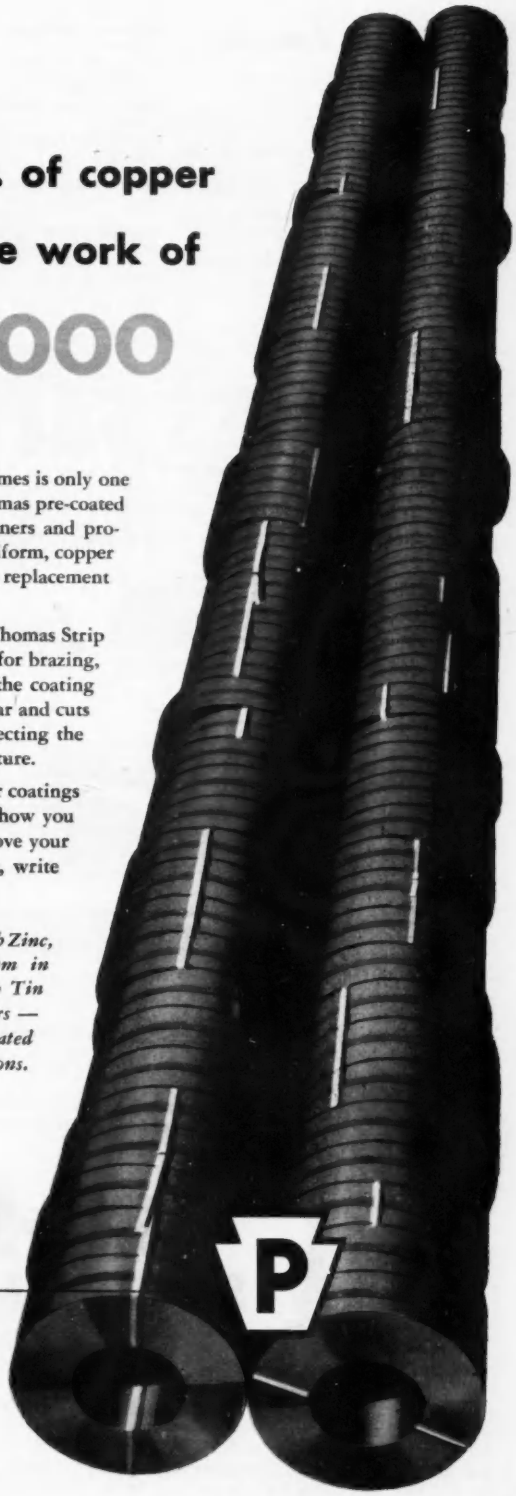
Great Lakes Steel Corp., Ecorse, Mich.
Hardware—448000 lbs.—$25,536
7000 shs.

Greer Hydraulic, Inc., Brooklyn 15, N. Y.
Unit propeller, governor test—9 ea.—$56,628
Stand assy.—$35,390

Grumman Aircraft Engr. Corp., Long Island, N. Y.
Antenna assy.—155 ea.—$28,156

(*Turn to page* 130, *please*)

How 40 lbs. of copper does the work of 2,000



Stretching the usefulness of copper as much as 50 times is only one of the ways you can save critical materials with Thomas pre-coated cold-rolled strip steel. In many applications, designers and production engineers find that the tightly adherent, uniform, copper pre-coat on steel serves their purpose adequately as a replacement for the pure metal.

The uniform non-peeling coating of copper on Thomas Strip has many functional advantages and is widely used for brazing, tinning, and soldering operations. In fabrication, the coating acts as a die lubricant, increases die life, reduces wear and cuts retooling costs. It has the added advantage of protecting the base metal from rust during the course of manufacture.

Pre-coated Thomas Strip is also available in other coatings to save critical materials as listed below. To learn how you can help conserve scarce non-ferrous metals—improve your product and speed production with Thomas Strip, write today for information.

Cold-rolled strip steel electrolytically pre-coated with Zinc, Copper, Brass, Nickel, Lead-Alloy and Chromium in Natural, Planished and Buffed Finishes—Hot Dip Tin and Lead Alloy Coated — Lacquer Coated in Colors — Annealed Spring Steel—Alloy Strip Steel—Uncoated Strip Steel. Carefully produced to your specifications.

Thomas Strip
a product of

Pittsburgh Steel Company

Thomas Strip Division
Warren, Ohio

Contract Awards

(*Continued from page 128*)

—H—

Hardwood Specialties of California, Los Angeles, Calif.
Motor vehicles parts—1700 ea.—$29,325

Harnischfeger Corp., Milwaukee, Wisc.
Repair parts—5 line items—$15,591

Harrison Radio Div., General Motors Corp., Lockport, N. Y.
Cooler assy. oil engine—65 ea.—$43,782

Hartman Electrical Mfg Co., Mansfield, Ohio
Relay, overvoltage generator system—13702—$195,958

Harval Truck Equip., Los Angeles 21, Calif.
Automotive repair parts—398 line items $14,109

The Heil Co., Milwaukee 1, Wis.
Motor vehicles—767 ea.—$25,172

Hercules Motor Corp., Canton 2, Ohio
Spare parts—$35,000

Herman Body Co., St. Louis, Mo.
Kit, enclosure—1279—$104,212

Holley Carburetor Co., Detroit, Mich.
Misc. parts—$281,976

Houdaille-Hershey Corp., Horde Engineering Div., Buffalo 11, N. Y.
Shimmey damper: for FH-1 Aircraft—27 ea.—$29,223

Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Roller bearings—$404,450

—I—

Inland Rubber Corp., Mansfield, Ohio
Tires—10000 ea.—$506,600

International Harvester Co., Truck Div., Los Angeles, Calif.
Repair parts—256 line items—$12,054
Repair parts—726 line items—$113,081

International Harvester Co., Washington, D. C.
Chassis, truck—13—$59,274

—J—

Jack & Heintz, Inc., Cleveland, Ohio
Starters—3712—$1,053,951
Generators—2134—$1,109,347
Starter—$628,149
Starters—1048—248,668
Generators, tachometer—$18,643
Inverters—347—$143,364
Starter—141—45,489

Jones & Laughlin Steel Corp., Pittsburgh 30, Pa.
Hardware—7813 shts.—$26,500
500000 lbs.

Johnson Motor Div. of Outboard, Marine & Mfg. Co., Waukegan, Ill.
Spare parts—various—61,677

—K—

Kearfott Co., Inc., New York 6, N. Y.
Wipers, window—580 ea.—$54,816

Kollsman Instr. Corp., Elmhurst, N. Y.
Machmeters—1731—$100,000

Kenworth Motor Truck Corp., Seattle, Wash.
Motor vehicle parts—660 ea.—$30,477

Walter Kidde & Co., Belleville, N. J.
Cylinder & valve assy.—$48,178

Kollsman Instrument Corp., Elmhurst, N. Y
Machmeters—$170,717
Indicator, airspeed—1339—$252,605

—L—

Lamson & Sessions Co., Cleveland 2, Ohio
Hardware—2100000 ea.—$56,840

LeLand Electric Co., Dayton, Ohio
Inverters—611—$280,288
Inverters—263—$129,621

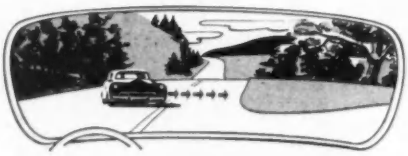
R. C. LeTourneau, Inc., Peoria, Ill.
Spare parts—$40,000
Spare parts—$63,000

The Lewis Engineering Co., Naugatuck, Conn.
Indicators—$99,190
Indicator, temp.—1784—$36,126

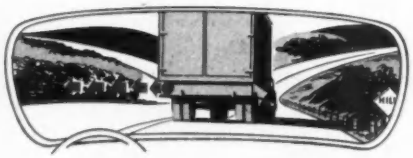
(*Turn to page 132, please*)

3 TIMES SAFER

Tung-Sol Signal Flashers permit a three-way flashing hook-up for automobile or truck direction signals.

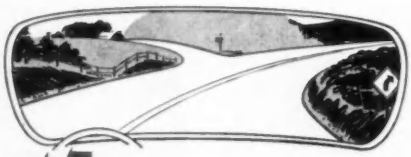


1 Warns the car approaching



2 Warns the car following

3 Instrument panel pilot light reassures the driver

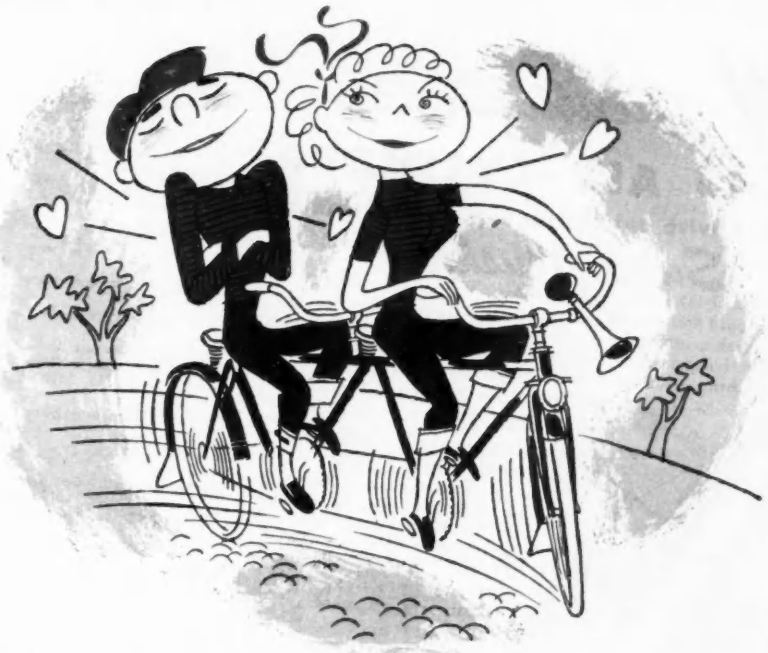


More than 13,000,000 have been used. Most of them outlast the cars they're on.

TUNG-SOL®
SIGNAL FLASHERS
Dependable!

Tung-Sol makes All-Glass Sealed Beam Lamps; Miniature Lamps; Signal Flashers; Cathode Ray, Radio, TV and Special Purpose Electron Tubes.

TUNG-SOL ELECTRIC INC., Newark 4, N. J. Sales Offices: Atlanta • Chicago Culver City (Calif.) • Dallas • Denver • Detroit • Newark • Philadelphia



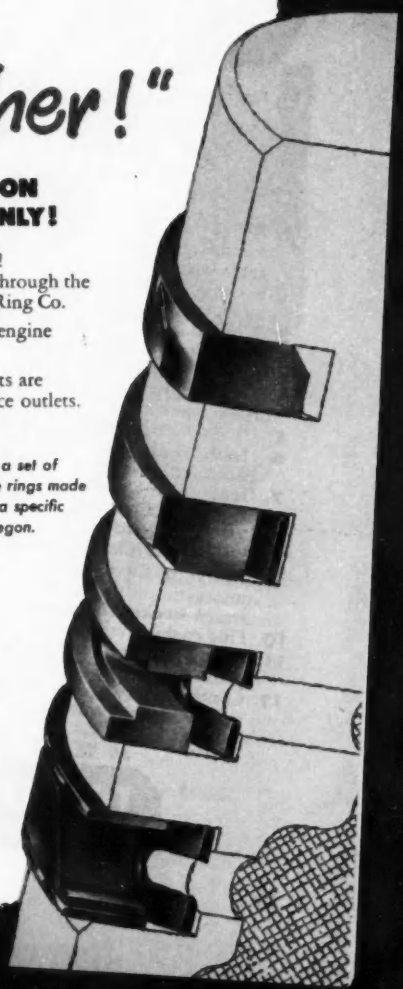
"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!

This set of service piston rings was not made for just any engine! These rings were designed and produced for *one* particular engine only, through the close collaboration of the car manufacturer* and Muskegon Piston Ring Co.

"Made for each other" in this exacting way, these rings and this engine will work together with *top* performance and economy.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.



Illustrated here is a set of chrome plated service rings made especially for a specific engine by Muskegon.

MUSKEGON Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

*Name on request.

Copyright 1952 by Muskegon Piston Ring Company

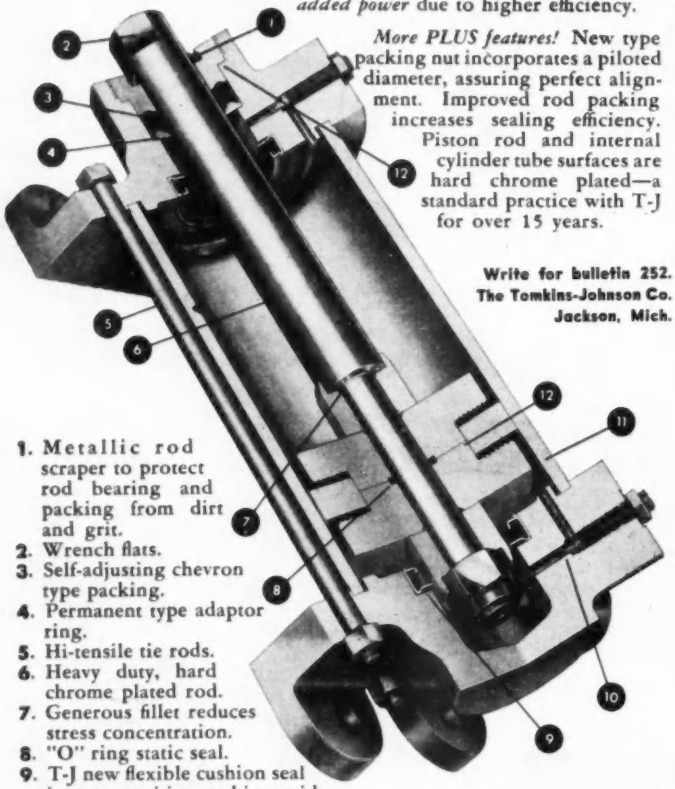
New Flexible Sealing...

T-J AIR CYLINDER

Designed with revolutionary application of

Super-Cushion

It's *sealed with pressure*—a revolutionary T-J application of flexible sealing that insures positive cushion action combined with automatic valving action for fast return stroke . . . eliminates binding and sticking . . . operates with *low friction, minimum wear,* and *added power* due to higher efficiency.



More PLUS features! New type packing nut incorporates a piloted diameter, assuring perfect alignment. Improved rod packing increases sealing efficiency. Piston rod and internal cylinder tube surfaces are hard chrome plated—a standard practice with T-J for over 15 years.

Write for bulletin 252.
The Tomkins-Johnson Co.
Jackson, Mich.

1. Metallic rod scraper to protect rod bearing and packing from dirt and grit.
2. Wrench flats.
3. Self-adjusting chevron type packing.
4. Permanent type adaptor ring.
5. Hi-tensile tie rods.
6. Heavy duty, hard chrome plated rod.
7. Generous fillet reduces stress concentration.
8. "O" ring static seal.
9. T-J new flexible cushion seal insures positive cushion with automatic valve action for fast return stroke. (Patent applied for)
10. Fine cushion adjustment.
11. Heavy wall precision honed hard chrome plate.
12. Controlled packing compression with metal to metal contact.

36 YEARS' EXPERIENCE T-J

TOMKINS-JOHNSON

RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . ANCHORS

Contract Awards

(*Continued from page* 130)

Lunn Laminates, Inc., Glen Cove, N. Y.
Radome—67 ea.—$58,960

Lycoming-Spencer Div., Avco Mfg. Corp., Williamsport, Pa.
Kit—$91,705

—M—

McCabe Power Auto Body Co., St. Louis, Mo.
Motor vehicle parts—842 ea.—$31,415

Manning—Bowman Div., McGraw Electric Co., Fostoria, Ohio
Tube, pitot static—1113—$24,118

Mansfield Tire & Rubber Co., Mansfield, Ohio
Tires and tubes—over $250,000

Glenn L. Martin Co., Baltimore, Md.
Spare parts—1083 ea.—$29,726
Maintenance parts—17 ea.—$26,921

L. G. Maulhardt Equip. Co., Oxnard, Calif.
Repair parts—65 line items—$36,415

W. L. Maxson Corp., New York, N. Y.
Maintenance parts—4033 ea.—$171,403

Metro Engineering & Mfg., Detroit 12, Mich.
Tank & combat vehicle parts—1003 ea.—$66,699

Michiana Products Corp., Michigan City, Ind.
Other motor vehicle—2060 ea.—$43,474
Tank & combat vehicle parts—1168 ea.—$49,294

Miller Mfg. Co., Detroit 4, Mich.
Tank & combat vehicle—275 ea.—$37,248

Miller & Smith Mfg. Co., Inc. & Miller & Smith Supply Co., Albuquerque, N. M.
Bulldozer, tank mounting—over $250,000

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Spare parts—$29,762

The Mohawk Rubber Co., Akron 5, Ohio
Tires & Tubes—22966 ea.—$1,177,588
Tires & tubes—over $250,000
Tire & tubes—over $250,000

Monroe Aire, Inc., Monroe, Mich.
Static Discharger—$26,850

Mott Haven Truck Parts, Inc., Bronx, N. Y.
Motor vehicle parts—622—$35,820

—N—

Nash Engr. Co., South Norwalk, Conn.
Parts, pump assy.—$55,370

The New York Air Brake Co., New York, N. Y.
Hydraulic pumps—$42,570

Northwestern Aeronautical Co., St. Paul, Minn.
Services & material—various—$41,000

(*Turn to page* 158, *please*)

LESS THAN 1% REJECTS

by BROACH-RIFLING Gun Barrels!

Less than 1% rejects? Yes . . . considerably less, for in a lot of 17,000 barrels, 20 mm., 72" long, there were *only 5 rejects* when the rifling was done on LAPOINTE BROACHING MACHINES. Everyone can remember that just prior to World War II, when rifling was done on conventional rifling machines, the rate of necessary rework often ran as high as 80% to 90%!

Now, in addition to the remarkable improvement in quality, there also is a significant production speed-up . . . with LAPOINTE BROACH-RIFLING. Here are some examples:

- In one plant, formerly one man ran two spindles and produced two barrels in 55 minutes. By Lapointe Broach-Rifling, the same man produced **50 per hour.** These were *finished barrels* — no reaming required, as before.
- A 20 mm. barrel was broach-rifled in **three minutes.** Former time, 4½ hours!
- A 37 mm. barrel was broach-rifled in **five minutes.** Former time, 6 hours!

LAPOINTE

Broach-rifling machines are fully described in our Bulletin HP-10.

50 YEARS IN BROACHING! We're the oldest in the world.
1902 • GOLDEN ANNIVERSARY • 1952

BROACHING is now the accepted method of rifling. If you contemplate handling such work, it will be to your advantage to consult LAPOINTE engineers. We have had the most experience in building broaching machines, broaching tools, and fixtures.

THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Friction material problem?

R/M BELONGS IN YOUR PICTURE!

"STOP-AND-GO" IS OUR BUSINESS!

Maybe you don't design and build heavy-duty tractors for the construction industry . . . but *whatever* your problems in brakes and clutches, you can count on RAYBESTOS-MANHATTAN for specialized friction materials that will perform as well for you as they are doing in the toughest construction equipment.

R/M leadership in friction materials is traditional in *many* industries: mine machinery, farm equipment, machine tools, and office equipment, to name a few. And in the automotive field you'll find indisputable evidence of R/M leadership. The record shows that more cars, trucks and buses use R/M brake linings, clutch facings, and automatic transmission friction parts than any other make.

Your R/M representative is ready to help you now. He can work from samples, from designs on paper, or from figures on horsepower developed, combined with desired performance characteristics. Behind him stand the full facilities of the world's largest maker of friction materials . . . with six great plants, their research departments, and their testing laboratories.

The opening of our new Wabash Division, Crawfordsville, Ind., provides expanded facilities for the manufacture of
SINTERED METAL FRICTION MATERIALS

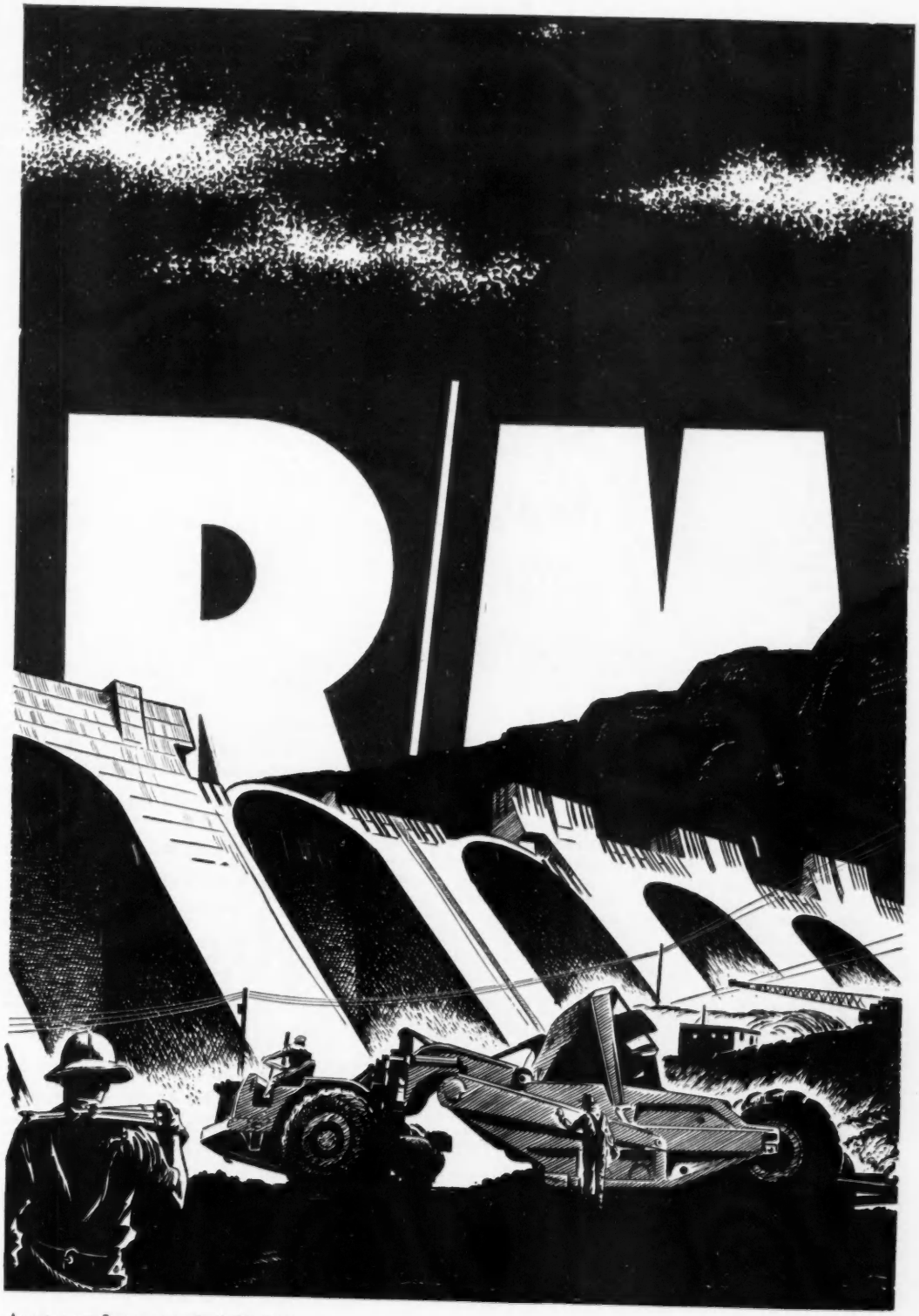
R/M
FIRST IN FRICTION

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION 445 Lake Shore Drive, Chicago 11, Ill.
Detroit 2 Cleveland 14 Los Angeles 11

Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.
Crawfordsville, Ind. Canadian Raybestos Co. Ltd., Peterborough, Ont.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Mechanical Packings • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls


R/W

New Defense Facilities

(*Continued from page 72*)

The Colonial Machine Co., Kent, Ohio.
Aircraft and ordnance parts—$32,000 (50)

Connecticut Mechanical Industries, Inc., Hartford, Conn.
Aircraft parts—$43,085 (75)

Continental Aviation & Engineering Corp., Detroit, Mich.
Aircraft engines—$140,722 (65)

Continental Diamond Fibre Co., Bridgeport, Pa.
Vulcanized fibre sheets—$1,050,000 (50)

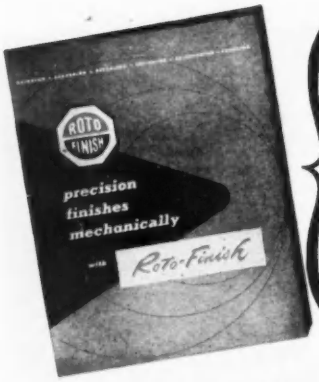
Continental-Diamond Fibre Co., Newark, Del.
Aircraft parts—$30,735 (50)

Continental Rubber Works, Erie, Pa.
Aircraft and ordnance parts—$24,498 (50)
Aircraft and ordnance parts—$8,331 (50)

Cooper Tire & Rubber Co., Findlay, Ohio.
Military truck tires—$982,381 (40)

Crawford Door Co., Detroit, Mich.
Aircraft parts—$173,003 (65)

A. Cresci & Sons, Inc., Vineland, N. J.
Aircraft parts—$14,849 (80)



Send for this New, Free Catalog Today!

Learn How *Roto-Finish* Can Solve your Finishing Problems at Lower Costs

Here's a new, fully illustrated catalog that shows you how you can improve the surface of your products at lowest costs with Roto-Finish, an original precision tumbling process. Learn how you can save money and manpower with Roto-Finish's wide choice of machines, equipment and materials that combine with Roto-Finish's Engineering Service and "know-how" to give you a practical solution to your finishing problems. Prove it to yourself. Write for your free copy today.

Roto-Finish COMPANY

associated with The Sturgis Products Co.
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P.O. Box 988 —
Phone 3-5378

FOREIGN REPRESENTATIVES: CANADA — Windsor — Roto-Finish Canada Limited • ENGLAND — London — Roto-Finish Limited — 39 Park Street — Mayfair • AUSTRALIA — Melbourne — A. Flavell Pty, Ltd. • HOLLAND — Delft — N. V. Roto-Finish Maatschappij — Rotterdamse — WEG 370A • AUSTRIA, GERMANY, SWITZERLAND — Frankfurt a.M. — Metallgesellschaft A.G., Germany • ITALY — Milan — Societa Roto-Finish a R.L. — Sesto S. Giovanni — Viale E. Marelli 31 • FRANCE — Paris — Societe Roto-Finish, 70 rue de la Republique-Puteaux (Seine) • BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formos Werco, Ltds.

VISIT BOOTHS 3 & 4, Aisle P. Industrial Finishing Exposition Chicago, June 16-20

— D —

The Dayton Rubber Co., Dayton, Ohio.
Military tires and tubes—$5,041,440 (25)

Detroit Harvester Co., Paris, Ky.
Aircraft engine parts—$600,000 (70)

Diversified Metal Products Co., Los Angeles, Calif.
Aircraft parts—$173,792 (70)

Dooling Bros., Los Angeles, Calif.
Aircraft parts—$4,181 (80)

Douglas Aircraft Co., Inc., El Segundo, Calif.
Airplanes—$77,477 (65)

— E —

Eaton Mfg. Co., Detroit, Mich.
Ordnance—$76,585 (50)

The Efficient Screw Products Corp., Cleveland, Ohio.
Aircraft products—$54,348 (50)

Electric-Switch & Controls, Inc., Culver City, Calif.
Relays for aircraft—$75,000 (65)

Electrical Engineering & Mfg. Corp., Los Angeles, Calif.
Aircraft parts—$9,436 (65)

Electric Corp., Pawtucket, R. I.
Aircraft and ordnance parts—$27,141 (80)

Empire Tool Products, Inc., New York, N. Y.
Aircraft parts—$9,697 (80)

Emsco Derrick & Equipment Co., Los Angeles, Calif.
Aircraft parts—$81,300 (70)

Engineering Metal Products Corp., Indianapolis, Ind.
Aircraft parts—$179,000 (50)

Enterprise Tool & Gear Corp., Detroit, Mich.
Precision gears for aircraft—$70,724 (70)

Etched Products Corp., Long Island City, N. Y.
Aircraft parts—$46,149 (50)

Experimental Specialties Co., El Segundo, Calif.
Aircraft parts—$28,898 (50)

— F —

Fairchild Engine & Airplane Corp., Hagerstown, Md.
Cargo airplanes—$98,761 (65)
Cargo airplanes—$114,180 (65)

Fairchild Engine & Airplane, Long Island, N. Y. (Farmingdale)
Aircraft parts—$25,648 (65)

The Fenn Mfg. Co., Hartford, Conn.
Helicopter parts—$9,932 (75)

Farrand Optical Co., Inc., Bronx, N. Y.
Aircraft parts—$101,250 (70)

Fenwal, Inc., Ashland, Mass.
Aircraft parts—$36,309 (65)

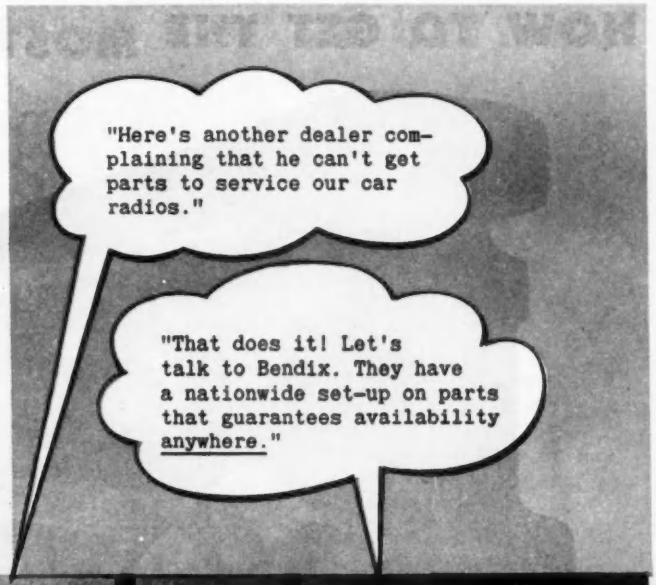
The Firestone Tire & Rubber Co., Los Angeles, Calif.
Military tires—$231,630 (60)

Firestone Tire & Rubber Co., Des Moines, Iowa.
Military tires—$8,806,245 (30)
Military tires—$799,000 (60)

The Firestone Tire & Rubber Co., Akron, Ohio.
Military tires—$110,000 (75)
Military tires—$178,400 (25)
Military tires—$440,000 (85)

(*Turn to page 140, please*)

Avoid Dealer Service Complaints on Your Auto Radios


"Here's another dealer complaining that he can't get parts to service our car radios."
"That does it! Let's talk to Bendix. They have a nationwide set-up on parts that guarantees availability anywhere."

TALK TO Bendix MOST TRUSTED NAME IN Radio

When a car owner can't tune in his favorite broadcast because the radio's crippled, somebody's going to catch a little wrath. The dealer gets it first and he doesn't waste any time passing it along to the factory.

The best way to get out of a mess like this is to do business with Bendix. It's seldom that a Bendix® Radio needs service but, when it does, there are 81 Bendix Authorized Parts Distributors strategically located from coast-to-coast. These distributors all carry a stock inventory for each receiver in their area.

The repairman's job is made easier, too. Every distributor has a supply of Service Data Sheets on Bendix radios. He'll be glad to furnish them *free of charge* to anyone requesting them.

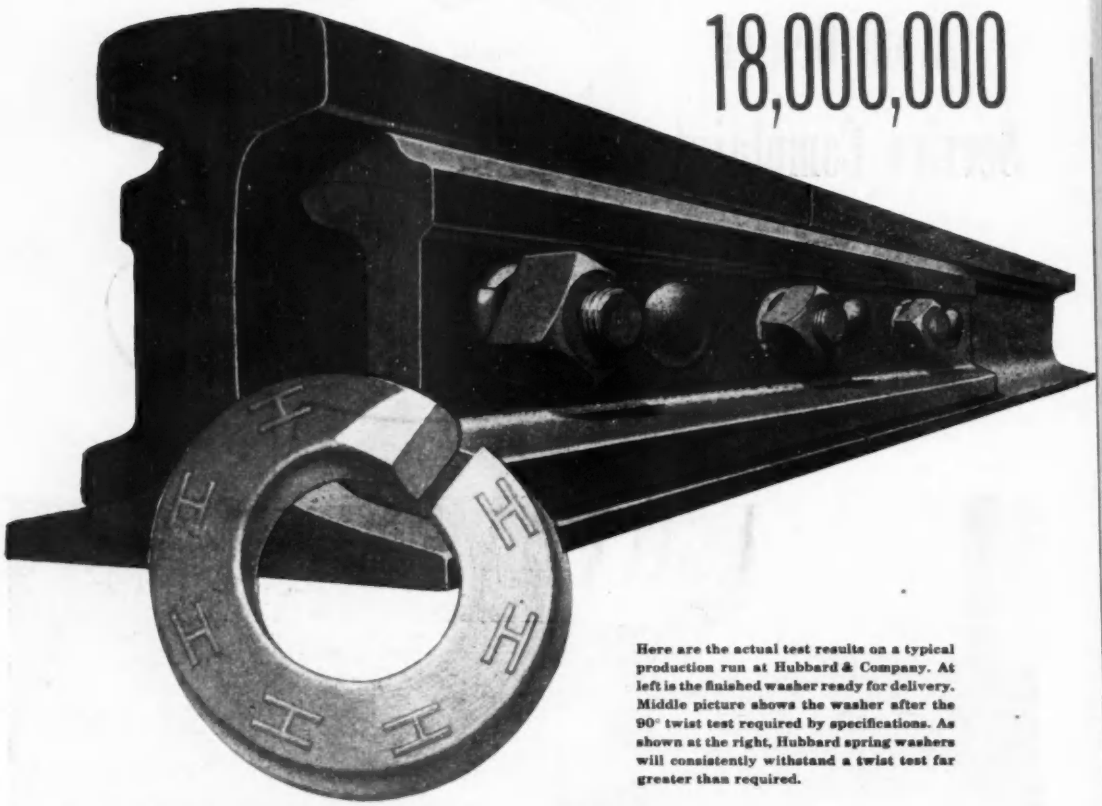
With an organization like Bendix behind your dealers, complaints about unavailability of parts will be a thing of the past. Bendix has many other advantages to offer you . . .

Get the complete story from our Detroit office.
261 McDougall, Detroit 7, Mich. • Phone: LOrain 8-1419 and 8-1313

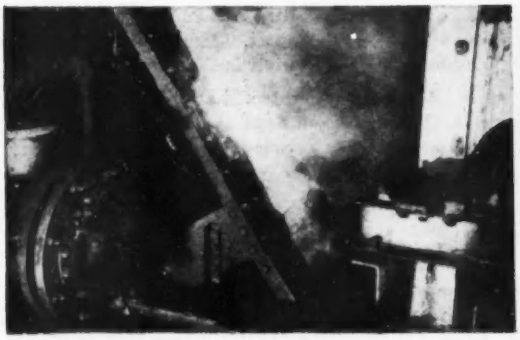
BENDIX RADIO DIVISION of
BALTIMORE 4, MARYLAND

®REG. U.S. PAT. OFF.

HOW TO GET THE MOST OUT OF THE 18,000,000



Here are the actual test results on a typical production run at Hubbard & Company. At left is the finished washer ready for delivery. Middle picture shows the washer after the 90° twist test required by specifications. As shown at the right, Hubbard spring washers will consistently withstand a twist test far greater than required.



At Hubbard, this variable speed conveyor removes spring washers from the quench tank on a precise time cycle. Here, the washers enter a low temperature rotary furnace.

This rotary furnace removes the oil and assures desired temperature control prior to batch tempering.

LEAN ALLOY STEEL YOU'RE GETTING

Carilloy spring washers used without one reported failure!

thanks to U·S·S metallurgical assistance

HUBBARD & COMPANY, Tool Division, Pittsburgh, Pa., is a major producer of rail joint spring washers. These vital washers are used on the bolts of the joint bars that connect sections of railroad rails. They prevent the bars from "freezing" and interfering with expansion and contraction of the rails. Battering and wear at the rail ends is reduced due to the high bolt tension caused by the reactive pressure of these CARILLOY steel washers.

You could hardly find worse service conditions. Temperatures often vary 50, 60, even 70 degrees in a single day. And, because they are part of the rail joint, these washers must cushion the wheel load shock of trains that every day become longer, heavier and faster.

Some time ago, our metallurgists got together with Hubbard engineers and came up with a vastly improved method of heat treating these alloy steel washers. This heat treating system has achieved uniform heating, precisely timed quenching and fool proof tempering. Result: a higher quality product, more uniform than ever before.

HERE'S THE COMPLETE STORY:

"Failure reports have stopped"

says B. J. McTighe, Superintendent, Tool Division, Hubbard & Company

"Since installing our new heat treating system, we've sold about 18,000,000 spring washers without one reported failure. The improved heat treatment, suggested by United States Steel, has resulted in more uniform structure, better mechanical properties and a retention of spring properties under all conditions. We can meet specifications even if alloy steel restrictions become more rigid in the future.

"These spiral spring washers, made from CARILLOY 9260 steel, are hardened to an average of 49/52 Rockwell C. Despite this high hardness, the washers easily meet the specification requiring a 90° cold twist in the fully heat treated condition. Our own shop control limits are even more severe than this to make sure that we meet and exceed railroad standards.

"These washers have exceptionally high and uniform reaction values. After they are compressed, these washers return to their original contour while retaining their spring properties. We think the superior performance is due to our improved heat treating system."

If you're having trouble handling lean alloys, we may be able to suggest heat treatment methods that will give you more uniform hardness, less rejects and less retreatments. Simply call or write our nearest district sales office.

U·S·S Carilloy Steels

USS

UNITED STATES STEEL COMPANY, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

2-350

UNITED STATES STEEL

NOW—

Get the Newest Service in Fastener Supply!

Up-to-the-Minute

STOCK LIST

Continuous Inventory of

CAMCAR

AN NAS CT SCREWS
PHILLIPS HEAD SCREWS
INDENTED HEX HEAD SCREWS
SHEET METAL SCREWS
SEMS
STANDARD — SPECIAL
Steel, Brass, Stainless, Aluminum

FOR PROMPT SHIPMENT

Daily production of millions of units means that our stocks are continuously being replaced and expanded. If your urgent needs are not listed in this stock list, it may be that they are in process of manufacture. If not, they can be promptly manufactured for you to your specifications.

Write For Your Copy of This New Stock List
Request On Your Letterhead Will Bring Regular Mailing

Telephone 5-9451 or Teletype RK-8653

CAMCAR

SCREW & MFG. CORP.
604 EIGHTEENTH AVE., ROCKFORD, ILL.

"PRODUCTION-DESIGNED FOR YOUR ASSEMBLY LINE"

Defense Facilities

(*Continued from page* 136)

The Firestone Tire & Rubber Co., Memphis, Tenn.
Military tires—$1,144,580 (30)
Military tires—$494,400 (55)

The Firestone Tire & Rubber Co., Pottstown, Pa.
Military tires—$2,216,050 (45)
Military tires—$132,500 (25)

Firestone Tire & Rubber Co., Wyandotte, Mich.
Ordnance—$101,450 (50)

Frederic Flader, Inc., North Tonawanda, N. Y.
Aircraft parts—$45,000 (65)

Florence Stove Co., Gardner, Mass.
Aircraft parts—$150,000 (65)
Aircraft parts—$75,000 (65)

Foote Bros. Gear & Machine Corp., Chicago, Ill.
Aircraft parts—$6,625 (75)
Aircraft parts—$195,000 (30)
Aircraft parts—$21,416 (70)
Aircraft parts—$53,631 (70)

Fuller Mfg. Co., Kalamazoo, Mich.
Ordnance—$66,348 (65)

Victor de Francesco, Cincinnati, Ohio.
Aircrafts products—$15,413 (70)

— G —

The Gates Rubber Co., Denver, Colo.
Military tires—$1,112,000 (30)
Military tires—$112,360 (50)

General American Transportation Corp., East Chicago, Ind.
Ordnance—$1,172,475 (65)

General American Transportation Corp., East Chicago, Ind.
Ordnance—$37,100 (65)

The General Fireproofing Co., Youngstown, Ohio.
Aircraft parts—$653,418 (65)

General Metals Corp., Burbank, Calif.
Aircraft parts—$107,800 (65)

General Motors Corp., Indianapolis, Ind.
Aircraft and ordnance parts—$594,200 (65)

The B. F. Goodrich Co., Miami, Okla.
Military tires—$581,588 (25)
Military truck tires—$3,459,475 (40)

The B. F. Goodrich Co., Los Angeles, Cal.
Military truck tires—$64,356 (30)

B. F. Goodrich Co., Oaks, Pa.
Military truck tires—$218,162 (50)

Goodyear Aircraft Corp., Litchfield Park, Ariz.
Aircraft parts—$447,574 (65)
Aircraft parts—109,581 (65)

Goodyear Aircraft Corp., Akron, Ohio.
Aircraft parts—$498,561 (65)
Aircraft parts—110,144 (65)

The Goodyear Tire & Rubber Co., Akron, Ohio.
Military tires—$191,535 (90)
Military truck tires—$2,890,420 (35)
Military tires—$2,310,000 (45)

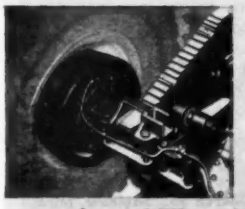
Goodyear Tire & Rubber Co., of Alabama, Gadsden, Ala.
Military truck tires—$286,060 (50)

(*Turn to page* 142, *please*)

Always specify

TDA BRAKES

when lives depend on faultless performance!



Speed and power in a vehicle call for positive stopping ability—and that means TDA Brakes! The Air Forces crash car shown here is a fine example of a military vehicle built for emergency use at an instant's notice—and providing perfect maneuverability and control. When vehicle performance can mean the difference between a minor accident and a major tragedy—between life and death—our armed forces don't take chances on equipment that might not get the job done. They insist on vehicles that are tested and proved in every respect. That's why American LaFrance, builders of the crash car shown on this page, installed the TDA "H" Series hydraulic brake illustrated at left. There are more TDA Brakes in actual use on heavy-duty commercial vehicles than any other make. More than forty years of brake engineering experience have made TDA America's greatest name in brakes!

TIMKEN *Detroit* BRAKES

TDA BRAKE DIVISION

THE TIMKEN-DETROIT AXLE COMPANY

ASHTABULA, OHIO

The Accepted TDA Standard

TRADE MARK REGISTERED

WHATEVER YOUR BRAKING PROBLEM—TAKE IT TO TDA!

TDA BRAKE DIVISION—DEPT. 5C, ASHTABULA, OHIO

Please mail brake information on these applications:

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Defense Facilities

(*Continued from page* 140)

The Goodyear Tire & Rubber Co., Topeka, Kans.
Military truck tires—$13,627,135 (30)

The Goodyear Tire & Rubber Co. of Michigan, Jackson, Mich.
Military truck tires—$5,670,910 (25)

Guardian Electric Mfg. Co., Woodstock, Ill.
Aircraft parts—$2,511,780 (65)

Grayce Industries, Inc., El Dorado, Kan.
Aircraft parts—$69,374 (70)

Great Lakes Mfg. Corp., Cleveland, O.
Aircraft parts—$44,154 (80)

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
Military aircraft—$146,706 (70)
Military aircraft—$86,860 (70)
Military aircraft—$19,770 (70)

—H—

Hammer Tool & Die Co., Detroit, Mich.
Aircraft parts—$6,412 (80)

The Han-Dee Spring & Mfg. Co., Hartford, Conn.
Aircraft products—$31,663 (50)

Hansen Engineering & Machinery Co., Lynn, Mass.
Aircraft and ordnance parts—$22,350 (80)

Hart Pressed Steel Corp., Elkhart, Ind.
Aircraft parts—$35,700 (65)

Hess, Inc., Perth Amboy, N. J.
Storage of petroleum products—$505,700 (40)

Hetherington, Inc., Sharon Hill, Pa.
Aircraft parts—$5,451 (65)

Roy J. Heyne Machine Co., Phoenix, Ariz.
Aircraft parts—$71,703 (70)

Hill Mfg. Co., Detroit, Mich.
Aircraft parts—$152,668 (70)

The Hobart Bros. Co., Troy, Ohio.
Aircraft components—$61,522 (75)

Holt Products Co., Holt, Mich.
Aircraft and ordnance parts—$16,553 (65)

Horst Engineering & Mfg. Co., Hartford, Conn.
Aircraft parts—$28,672 (50)

—I—

Inland Steel Products Co., Milwaukee, Wis.
Aircraft parts—$1,647,300 (50)

The Hydraulic Press Mfg. Co., Mt. Gilead, O.
Aircraft parts—$380,000 (65)

Intercontinental Mfg. Co., Inc., Garland, Texas.
Aircraft components—$570,600 (65)

International Nickel Co., Inc., Huntington, W. Va.
Nickel alloy tubing for aircraft—$218,200 (50)

Interstate Engineering Corp., El Segundo, Calif.
Aircraft parts—$19,293 (75)

Intertype Corp., Brooklyn, N. Y.
Aircraft parts—$109,170 (80)

I-T-E Circuit Breaker Co., Phila., Pa.
Aircraft and electronic parts—$997,120 (65)

—J—

Jackson & Church So., Saginaw, Mich.
Aircraft and ordnance—$158,350 (80)

Janney Cylinder Co., Phila., Pa.
Aircraft parts—$73,983 (75)

J. & L. Mfg. Co., Bridgeport, Conn.
Parts for aircraft—$24,565 (70)

—K—

William Karl & Sons, Middle Village, N. Y.
Aircraft parts—$49,030 (80)

Kellett Aircraft Corp., Camden, N. J.
Electronic equipment—$16,934 (75)

Kell-Strom Tool Co., Inc., Wethersfield, Conn.
Aircraft parts—$95,726 (70)

Kelsey-Hayes Wheel Co., Jackson, Mich.
Ordnance—$355,000 (65)

Kelsey-Hayes Wheel Co., McKeesport, Pa.
Ordnance—$205,450 (65)

Kuehler-Huhn Co., Inc., Phila., Pa.
Aircraft parts—$12,137 (80)

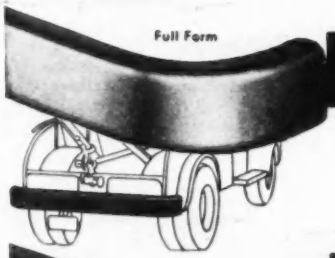
(*Turn to page* 144, *please*)

NASH

BODY-GARD BUMPERS are 3 ways better!

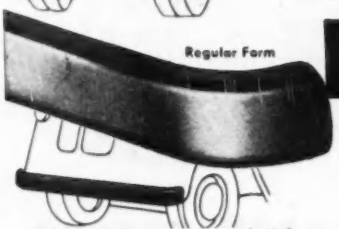
Body-Gards PROTECT

High tensile steel and channel type construction combine maximum protection, strength and durability with minimum weight.



Body-Gards FIT

To fit your vehicle, front or rear, Body-Gards are made in any length you specify, in any one of the three styles shown and in five face widths.*



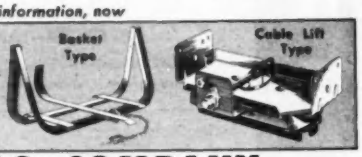
Body-Gards SAVE

By their economical cost and by the repair bills they prevent, Body-Gards help reduce vehicle operating costs.

*Five Face Widths 3½", 4½", 5½", 6" and 6¾" wide.

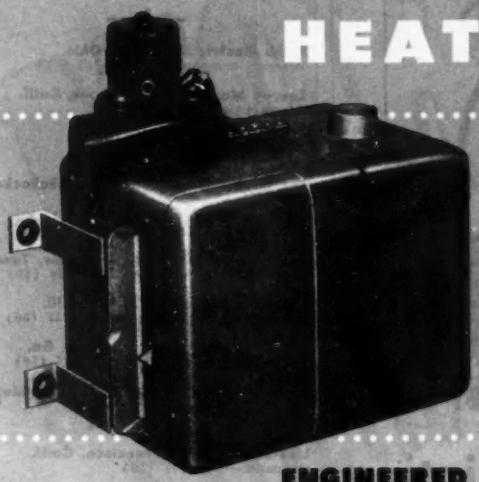
Body-Gard Bumpers custom built for your truck, bus or trailer are easy to order. Write for information, now

Ask For Details on
NASH TIRE CARRIERS
For Original Equipment or Replacement. The complete Nash line includes the right tire carrier for every type of commercial vehicle.



NASH BROS. COMPANY
2125 DEWEY AVENUE • EVANSTON, ILLINOIS
SEE YOUR EQUIPMENT SUPPLIER OR WRITE DIRECT FOR FOLDER

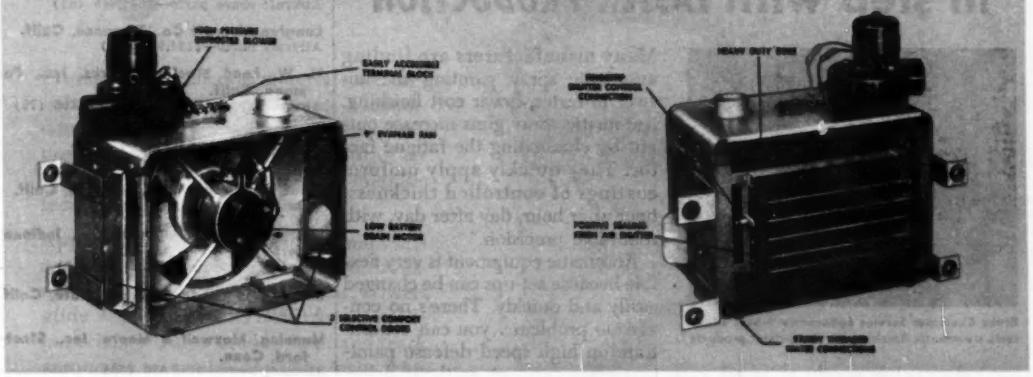
NEED POWERHOUSE HEAT OUTPUT?



THIS EVANS *Fresh Air* HEATER-DEFROSTER WAS CUSTOM BUILT TO DELIVER 25,000 BTU OUTPUT

Full fresh air intake, with heat modulated by control of water flow, is but one typical quality feature custom built into this Evans high performance truck cab heater.

ENGINEERED FEATURES LIKE THESE GIVE YOU MORE FOR YOUR HEATER DOLLAR



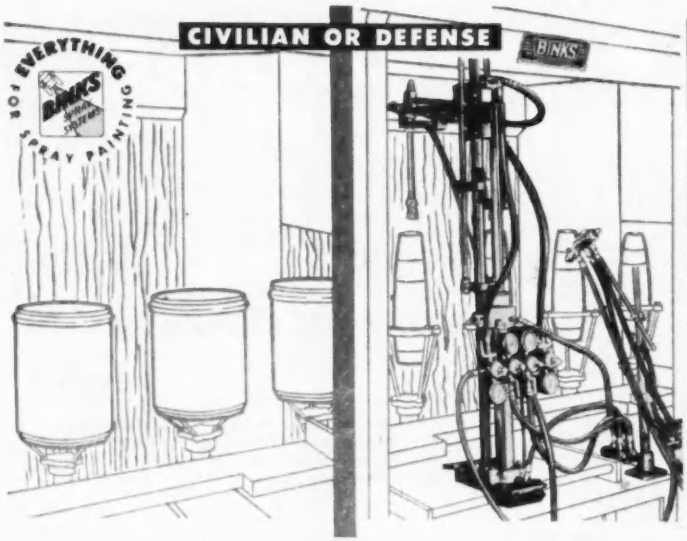
EVANS ENGINEERING IS AVAILABLE TO HELP SOLVE YOUR PROBLEM

Evans automotive heating and ventilating equipment is engineered in detail for each individual installation. Experience proves that only with such custom construction can a truly satisfactory heating and ventilating system be devised for the wide variety of commercial cars, trucks and buses now on the road or on the drawing board.

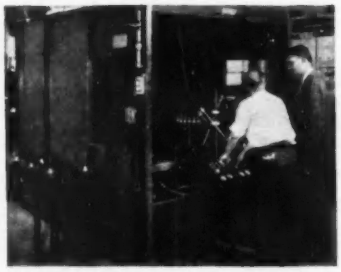
The Evans organization is staffed to engineer promptly an installation to your specifications, organized to build prototypes quickly, equipped to conduct precision tests to latest A. S. H. V. E. procedures. Military experience dating back to World War I qualifies Evans to work well with you in meeting the rigid specifications of the Armed Forces. If your needs are for high performance, ruggedly constructed automotive heating and ventilating equipment—custom built to your specifications—it will pay you to consult *Evans Products Company, Heating & Ventilating Division, Dept. P-34, Plymouth, Michigan.*

Copyright 1952, Evans Products Company

EVANS *ENGINEERS CUSTOM HEATING AND VENTILATING FOR A WORKING WORLD ON WHEELS*



How to keep spray painting in step with *FASTER PRODUCTION*



Binks Customer Service Laboratory where Binks tests automatic finishing on customers' products

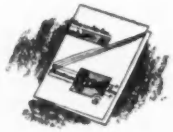
Many manufacturers are finding automatic spray painting the answer to faster, lower cost finishing. Automatic spray guns increase output by eliminating the fatigue factor. They quickly apply uniform coatings of controlled thickness, hour after hour, day after day, with robot-like precision.

Automatic equipment is very flexible because set-ups can be changed easily and quickly. There's no conversion problem...you can concentrate on high speed defense painting today, yet be ready to switch over to civilian products without delay.

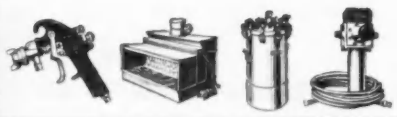
It costs nothing to find out if your products can be finished economically by automatic methods. Private tests are run by Binks on *your* products, using *your own* or specified materials. You receive a confidential report showing what production and savings you can expect. There is no obligation.

Send now for this informative Bulletin

Tells how you can have better finishes—faster—and at lower cost. Lists 260 major defense products that have been painted or coated successfully with Binks engineered equipment. Illustrates many of the finishing systems used. Just ask for Bulletin 10. No obligation, of course. Address: Binks Manufacturing Company, 3120-30 Carroll Ave., West, Chicago 12, Ill.



Binks
EVERYTHING FOR SPRAY PAINTING



GUNS • SPRAY BOOTHS • MATERIAL TANKS • EXTRACTORS & ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

Defense Facilities

(*Continued from page* 142)

—L—

Lamb Electric Co., Kent, Ohio.
Aircraft components—$150,657 (75)

Leeroy Machine Co., Burbank, Calif.
Aircraft parts—$3,095 (80)

The Lee Co., Hartford, Conn.
Aircraft parts—$11,235 (80)

Lee Rubber & Tire Corp., Conshohocken, Pa.
Military truck tires—$76,700 (50)
Military truck tires—$488,600 (30)

R. G. LeTourneau, Inc., Longview, Texas.
Earth moving equipment—$50,406 (50)

R. G. LeTourneau, Inc., Peoria, Ill.
Earth moving equipment—$112,059 (50)

R. G. LeTourneau, Inc., Toccoa, Ga.
Earth moving equipment—$72,677 (50)

Liberty Products Corp., Farmingdale, N. Y.
Aircraft parts—$110,800 (70)

Link-Belt Co., San Francisco, Calif.
Ordnance—$111,705 (50)

Lockheed Aircraft Corp., Burbank, Calif.
Aircraft and related spare parts—$381,707 (65)
Aircraft spare parts—$944,885 (65)

Longren Aircraft Co., Torrance, Calif.
Aircraft parts—$131,934 (65)

H. W. Loud Machine Works, Inc., Pomona, Calif.
Aircraft hydraulic systems—$20,805 (70)

—M—

MacClatchie Mfg. Co., Compton, Calif.
Aircraft parts—$22,436 (80)

McCreary Tire & Rubber Co., Indiana, Pa.
Military truck tires—$217,121 (25)

Magna Mill Products, South Gate, Calif.
Aircraft parts—$302,294 (75)

Manning, Maxwell & Moore, Inc., Stratford, Conn.
Aircraft parts—$187,670 (70)

Mansfield Tire & Rubber Co., Mansfield, Ohio.
Military truck tires—$226,737 (55)

Maremont Automotive Products, Inc., Cicero, Ill.
Ordnance parts—$260,585 (65)

Mars Mfg. Co., Inc., Long Island City, N. Y.
Aircraft parts—$19,800 (75)

The Glenn L. Martin Co., Middle River, Md.
Military aircraft—$335,375 (70)

Marquardt Aircraft Co., Van Nuys, Cal.
Aircraft parts—$695,000 (65)

Master Electric Co., Dayton, Ohio.
Aircraft parts—$222,154 (50)

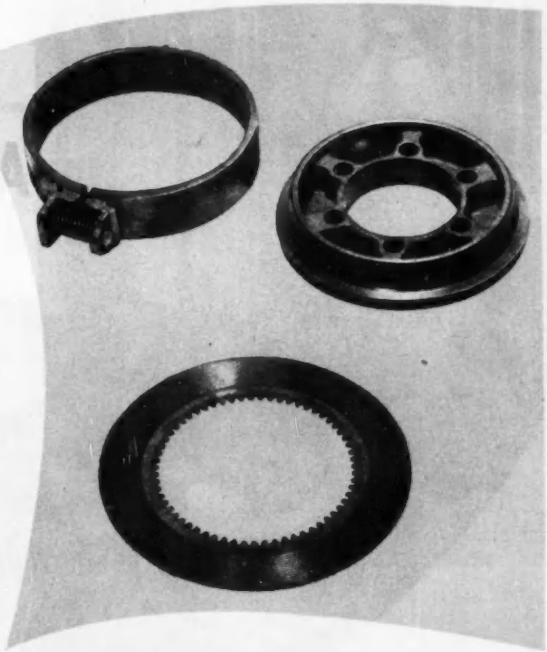
Metal Spinners, Inc., Milwaukee, Wis.
Aircraft parts—$58,500 (70)

Michigan Steel Castings Co., Detroit, Mich.
Aircraft parts—$12,015 (65)

(*Turn to page* 148, *please*)

MORAINE

an important producer of friction materials



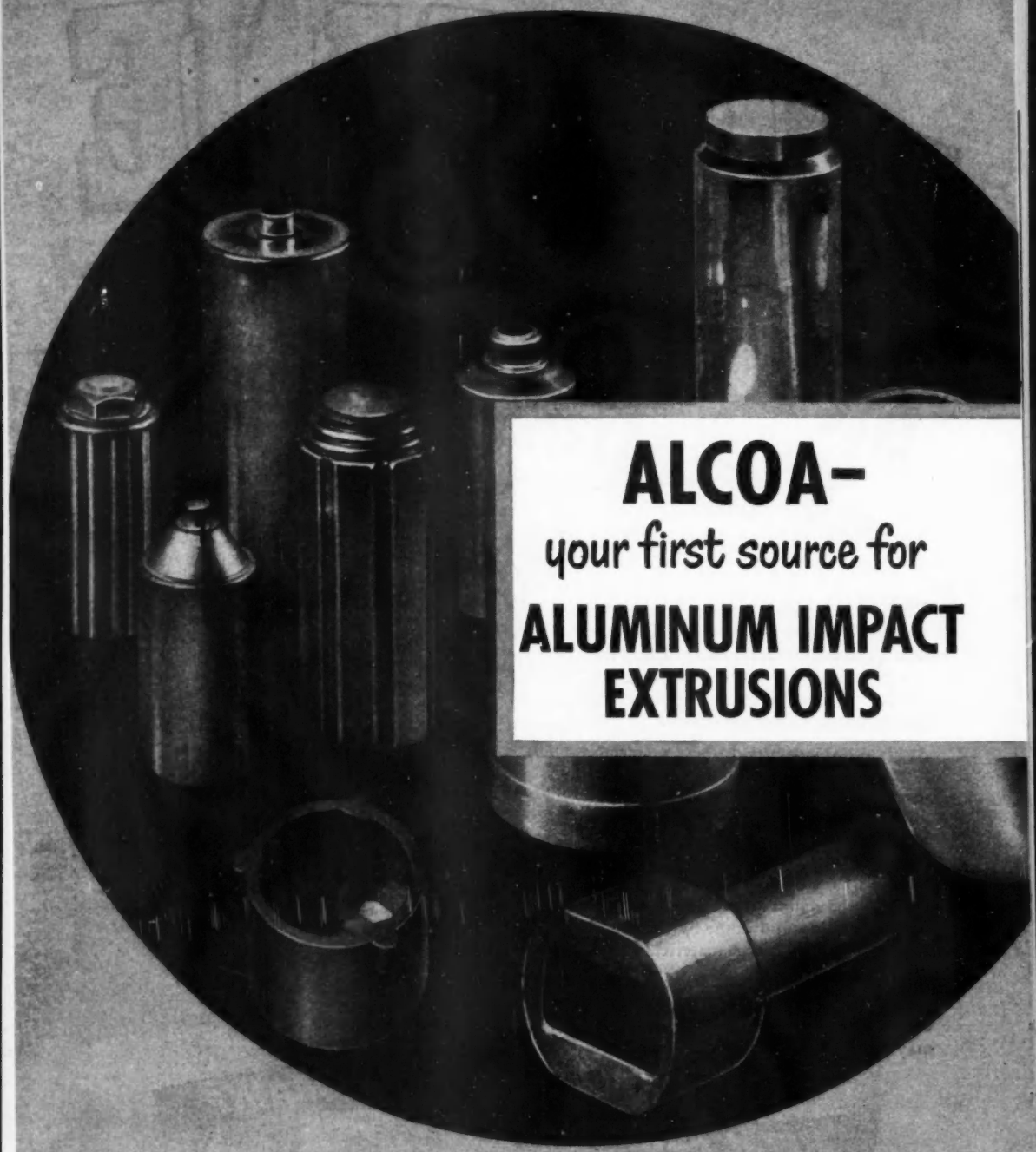
Products using friction materials are big-volume business at Moraine. Custom-developed friction materials utilizing the powder-metallurgy process and/or other special semi-metallic or non-metallic facings are in active production.

Applications are broad: these materials are in standard use on automotive transmissions such as the Hydra-Matic, Powerglide and Dynaflow. These custom-made materials are also used in tank and truck automatic transmissions. The principles involved have many additional applications in the automotive and household appliance fields, and in the Army, Navy, Air Force and Ordnance materiel.

If your needs meet normal production methods here, and the quantity is sufficient to justify tooling costs, Moraine may be able to help you.

METAL POWDER PARTS BY MORAINE

MORAINE PRODUCTS
DIVISION OF GENERAL MOTORS • DAYTON, OHIO



ALCOA–

your first source for

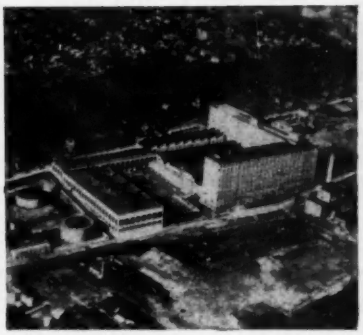
ALUMINUM IMPACT EXTRUSIONS

"SEE IT NOW," with Edward R. Murrow, brings the world to your armchair . . . CBS-TV every Sunday—3:30 P. M. EST

ALUMINUM COMPANY OF AMERICA

Facilities like these mean satisfaction with your source of supply—

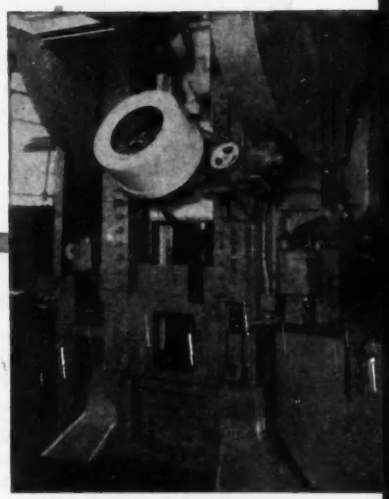
HIGH PRODUCTION from Alcoa facilities is typified by this battery of impact-extrusion presses equipped with automatic trimming units.



THE ALCOA PLANT, located at Edgewater, New Jersey, indicates the large impact-extruding capacity available at Alcoa. All the services of design consultation, estimating, production and secondary operations are performed here.

PRESSES OF ALL SIZES enable Alcoa to offer you facilities that permit free thinking in your engineering designs.

- Design help backed by technical literature, personal attention of Alcoa sales engineers and the facilities of the world's greatest aluminum research laboratories.
- 30 years' experience in making impact extrusions; 64 years' experience in working with aluminum.
- Ample capacity for large production runs and complete secondary operations such as flanging, flaring, beading and machining.



ALCOA'S NEW PRESSES not only extrude the desired section but trim it automatically as well.

Ask ALCOA first whatever you need in Aluminum

While the sale of our products is presently controlled by government regulations, you'll find no limitations on help in design, application or fabrication. Your local Alcoa sales office is headquarters for "everything" in aluminum. Alcoa sales engineers will co-operate to the fullest in helping you get the metal you need. Look for Alcoa under "Aluminum" in your classified phone book.

ALUMINUM COMPANY OF AMERICA
2164D Gulf Building • Pittsburgh 19, Pa.

SHEET, PLATE, FOIL

TUBE, PIPE AND PIPE FITTINGS

ELECTRICAL CONDUCTORS

EXTRUSIONS AND ROLLED SHAPES

CASTINGS AND FORGINGS

FASTENERS AND SCREW MACHINE SPECIALTIES

PAINT PIGMENTS, FLUXES AND LUBRICANTS

WIRE, ROD AND BAR

ALCOA *first in* ALUMINUM

Defense Facilities

(*Continued from page* 144)

Mitchel & Scott Machine Co., Inc., Indianapolis, Ind.
Aircraft parts—$35,379 (75)

Modglin Co., Inc., Los Angeles, Calif.
Aircraft parts—$589,961 (65)

The Mohawk Rubber Co., Akron, Ohio.
Military truck—$1,206,400 (30)

Moorless Mfg. Co., Los Angeles, Calif.
Aircraft parts—$36,775 (70)

Morse Chain Co., Detroit, Mich.
Ordnance parts—$248,550 (50)

Morton Mfg. Co., Libertyville, Ill.
Airplane landing steel mat—$145,428 (65)

Murphy Diesel Co., Milwaukee, Wis.
Diesel engines—$67,525 (50)

— N —

National Brass Co., Grand Rapids, Mich.
Ordnance—$45,165 (80)

National Gypsum Co., Niles, Ohio.
Aircraft parts—$170,000 (65)

National Screw & Mfg. Co., of California, Los Angeles, Calif.
Aircraft parts—$189,117 (50)

National Supply Co., Torrance, Calif.
Aircraft landing gear—$57,834 (65)

W. H. Nichols Co., Waltham, Mass.
Aircraft parts—$112,648 (70)
Aircraft parts—$140,000 (65)

C. A. Norgren Co., Englewood, Colo.
Aircraft parts—$512,000 (40)
Aircraft parts—$85,885 (60)

— O —

O'Keef & Merritt Co., Los Angeles, Cal.
Engine generators sets—$40,000 (65)

Olson Mfg. Co., Worcester, Mass.
Aircraft parts—$65,961 (75)

Omaha Production Co., Omaha, Neb.
Hydraulic pumps for aircraft—$379,061 (65)

John Oster Mfg. Co., Racine, Wis.
Aircraft motors—$25,548 (80)

— P —

Pacific Airmotive Corp., Burbank, Calif.
Aircraft engines—$88,203 (65)

Pacific Car & Foundry Co., Renton, Wash.
Ordnance—$35,000 (65)

Pacific Tire & Rubber Co., Oakland, Cal.
Military tires—$22,564 (25)
Military truck tires—$3,400 (25)
Military truck tires—$10,994 (25)
Military tires—$146,625 (25)

Packard Mfg. Co., Indianapolis, Ind.
Tank parts—$14,869 (75)

Packard Motor Car Co., Detroit, Mich.
Aircraft parts—$2,139,300 (65)

The Parker Appliance Co., Cleveland, O.
Aircraft parts—$83,103 (70)

Perfex Corp., Milwaukee, Wis.
Aircraft parts—$2,962 (65)
Aircraft parts—$36,846 (70)

Phaostron Co., S. Pasadena, Calif.
Aircraft parts—$20,360 (75)

Photoswitch, Inc., Cambridge, Mass.
Aircraft parts—$130,000 (65)

The Pierce Governor Co., Inc., Anderson, Ind.
Ordnance—$111,308 (75)

Porter-Cable Machine Co., Syracuse, N. Y.
Actuator parts for aircraft—$43,000 (50)

Precision Sheet Metal Inc., Culver City, Calif.
Aircraft assemblies—$407,592 (65)

— R —

Raytheon Mfg. Co., Oxnard, Calif.
Aircraft parts—$10,871 (65)

Raytheon Mfg. Co., Point Magu, Calif.
Aircraft parts—$8,806 (65)

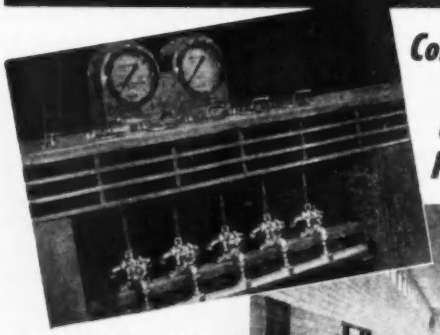
Raytheon Mfg. Co., Waltham, Mass.
Aircraft parts—$27,117 (65)
Aircraft parts—$27,233 (65)

Reaction Motors, Inc., Rockaway Township, N. J.
Aircraft components—$493,000 (65)

The Reflectone Corp., Stamford, Conn.
Aircraft parts—$15,935 (75)

(*Turn to page* 150, *please*)

120 NOPAK Valves



Control Intake and Drain Gates of Nottingham Filtration Plant

Close-up of one of the 24 control tables showing five NOPAK Valves panel-mounted and connected to manifolds. Large gauges indicate rate of flow.

General view of one of the two filter galleries. Each has 12 control stations.

This recent major addition to Cleveland's water supply system, having a normal capacity of 100,000,000 gallons per day, employs water-hydraulic valves and cylinders wherever possible.

120 NOPAK ¾", 4-way, all bronze, 250 lb. type valves, panel-mounted . . . "fed" and exhausted through manifolds . . . actuate the double acting cylinders which open and close the *intake* and *drain gates* for filtration and backwash operations.

Five NOPAK Valves are mounted at each of the 24 table control stations. There are 12 stations in each of the two filter galleries, and one operator normally takes care of all 24 stations.

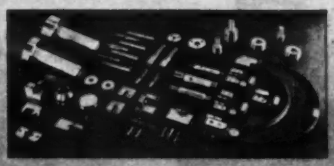
For Technical Data on NOPAK Valves and Cylinders, refer to Sweet's File for Product Designers, or write for Bulletin SW-1.

GALLAND-HENNING MFG. COMPANY
2774 S. 31st St., Milwaukee 46, Wis.

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE
A 7095-½-IA

For gaging and sorting tappets at the rate of 3600 parts per hour.

Electronic Gaging & Sorting Machine



Standard A.G.D. & Special Gages

gages

PRODUCTION · PRECISION · ENGINEERING

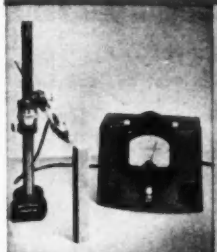
Machine checks servo unit for Automatic Transmission.

Hydraulic Test Machine

For a quarter of a century the MERZ Organization has been engineering the tools and gages demanded by the Automotive Industries to maintain its high standards of precision and production.

Shown here are a few of the Measuring and Sorting Machines currently being furnished by MERZ to the Automotive Industries. Also, the MERZ line of Exactitude A.G.D. gages has been accepted as standard by the Industry.

Write MERZ for Catalog with additional information.



Model B-10

Standard Electronic Height Gage Indicator

Gage has indicating scales accurate to .00001 and .0001 of an inch.

Model A-10 Electronic Comparator & Indicator

Engineered to provide a dependable and high magnification gage.

Model 60 Air Gage

MERZ *Engineering Inc.*

200 S. HARDING
INDIANAPOLIS 7, INDIANA

Hydraulic Final Test Machine
Machine tests Automatic Transmission under simulated actual driving conditions.

Wrist Pin Gaging & Sorting Machine
Parts tested for hardness, finish, length, taper and roundness at the rate of 3600 per hour.

cool this quench oil tank for 1/3 the cost

At the K-D Manufacturing Company, a manufacturer of metal stampings, Platecoils were installed in an oil quench tank for only 1/3 the cost quoted by a standard heat exchanger manufacturer. Three hundred pounds of material per hour had to be quenched from 1600 °F. to 140 °F. with the quench oil being recirculated at 15 gpm. The Platecoils were specified to maintain oil temperature of 110 °F. using 75° cooling water at 6 gpm.

The efficiency of the Platecoils exceeded expectations, reducing the oil temperature to 85 °F. **within 25 minutes.** According to Mr. Madeira, Tool Room Foreman: *"Under extreme summer temperatures and the largest loads ever quenched, the installation maintained the desired quench temperatures."*

The reason Platecoils cost so much less is they have so much more effective heating or cooling area in a limited space. For instance, a 22" x 47" Platecoil gives the same heat transfer surface as 32 ft. of 1½" pipe which would require approximately 30" x 60" of space. Thus a Platecoil only half the size often provides a much greater BTU transfer per unit area. This means savings in initial cost, tank space and installation time.

Everywhere that Platecoils are used the story is always the same: They heat or cool faster, can be installed quicker at only a fraction of the cost of other methods. Write for Bulletin No. P74.

PLATECOILS gives you these ADVANTAGES

- Cleaned and Repaired Without Dumping Tank Solution
- Greater BTU Transfer Per Unit Area
- Weighs Only Half as Much as Pipe Coil
- No Threaded Joints in Tank
- Increased Tank Capacity
- Fast, Easy Installation
- Easy to Clean

Defense Facilities

(*Continued from page* 148)

Research Welding & Engineering Co., South Gate, Calif.
Aircraft parts—$11,343 (65)

Revenna Metal Products Corp., Seattle, Wash.
Aircraft parts—$198,564 (75)

Reynolds Industries, Inc., Santa Monica, Calif.
Components for aircraft—$219,105 (80)

Ring Screw Works, Macomb County Mich.
Aircraft parts—$97,868 (50)
Aircraft parts—$350,000 (30)

Ripley Mfg. Co., Croswell, Mich.
Aircraft parts—$83,000 (70)

Robbins Engineering Co., Highland Park, Mich.
Aircraft parts—$102,000 (65)

The Roberts Brass Mfg. Co., Detroit, Mich.
Aircraft parts—$7,710 (80)

Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Aircraft parts—$100,615 (50)

The Ryan Aeronautical Co., San Diego, Co.
Aircraft parts—$25,241 (65)

—S—

Safeway Heat Elements, Inc., Middletown, Conn.
Aircraft parts—$29,799 (65)

Saxco Mfg. Co., Los Angeles, Calif.
Aircraft parts—$22,987 (80)

Scott-Atwater Co., Inc., Minneapolis, Minn.
Aircraft parts—$36,586 (80)

Scott & Williams, Inc., Laconia, N. H.
Aircraft parts—$108,392 (75)
Aircraft parts—$115,945 (75)
Aircraft products—$165,455 (75)

Seiberling Rubber Co., Akron, Ohio.
Military truck tires—$385,320 (50)

Sinclair Products Co., Windsor, Vt.
Aircraft parts—$11,000 (80)

Smallwood & Son Machine Co., Dallas, Texas.
Aircraft parts—$16,275 (50)

A. O. Smith Corp., Milwaukee, Wisc.
Aircraft and ordnance—$598,000 (65)

Solar Aircraft Co., San Diego, Calif.
Aircraft parts—$35,203 (65)
Aircraft components—$178,800 (65)

South Bend Bait Co., South Bend., Ind.
Aircraft parts—$7,052 (65)

Southwest Welding & Mfg. Co., Richmond, Calif.
Earth moving equipment—$112,863 (60)

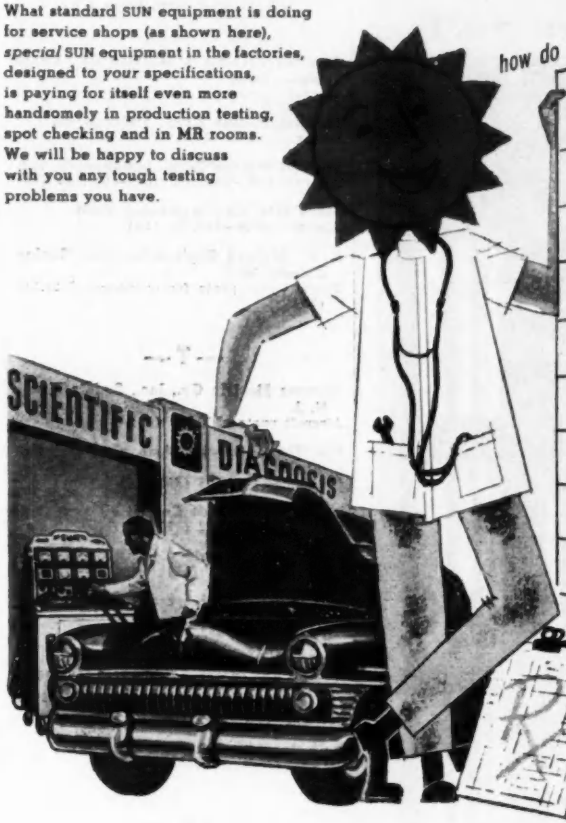
Southworth Machine Co., Portland, Me
Aircraft parts—$210,000 (40)

Sprinkle Machine Co., Galveston, Ind.
Aircraft engine parts—$16,320 (80)

(*Turn to page* 152, *please*)

ENGINEERS of Car factories, Engine builders, Component parts manufacturers, PLEASE NOTE:

What standard SUN equipment is doing for service shops (as shown here), *special* SUN equipment in the factories, designed to *your* specifications, is paying for itself even more handsomely in production testing, spot checking and in MR rooms. We will be happy to discuss with you any tough testing problems you have.



how do your service figures compare with these?

TYPE OF JOB	NUMBER OF CARS SERVICED PER MONTH 250	500	750	1000
BATTERY	146	292	438	584
STARTER	77	153	230	306
GENERATOR	136	271	407	542
CARBURETOR	145	290	435	580
FUEL PUMP	56	111	167	222
SPARK PLUG	65	129	194	258
VALVE-RING	53	106	159	212
COIL-CONDENSER	19	37	56	74
DISTRIBUTOR	120	239	359	478

SUN makes it easier for you

. . . to sell ALL the work the engine NEEDS

Shops using SUN Diagnosis Equipment and the SUN Diagnosis Program are doing more repair operations per car, making more profit per car, eliminating comebacks and making happy, steady customers.

The above figures show the amount of service work vehicles need—work which *should* be done. The figures are based on country-wide reports from small, medium and large shops using SUN Equipment.

With SUN Motor Testers, Distributor Testers and other SUN Diagnosis Equipment, thousands of shops are uncovering two to three times as many NEEDED repair operations per car as are usually found without such scientific equipment. Consequently these shops not only have larger labor and parts sales but eliminate guesswork and needless repairs and replacements. This means higher profits and better satisfied customers.

Tell us the number of vehicles you service per month. We will send you a more complete report on what you can expect in increased sales and profits from a SUN Diagnosis Program. There is no obligation.

KW2A1

Sun ELECTRIC CORPORATION 6373 AVONDALE AVENUE CHICAGO 31, ILLINOIS

"CHICAGO"
precision valve gear parts

Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers Split Valve Locks • Rocker Arm Shafts •

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Remote Control Levers
Automatic Transmission Valves.....Water Pump Shafts

Special Screw Machine Parts 1/16" to 3" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

Defense Facilities

(*Continued from page* 150)

Stockton Tool-Die & Machine Co., Costa Mesa, Calif.
Aircraft parts—$34,293 (80)

Stewart-Warner Corp., Chicago, Ill.
Ordnance parts—$108,672 (65)

Stewart-Warner Corp., Indianapolis, Ind.
Aircraft and ordnance parts—$90,486 (65)

Stone Mfg. Co., Inglewood, Calif.
Aircraft parts—$89,899 (70)

E. C. Styberg Engineering Co., Racine County, Wis.
Transmission parts for ordnance—$129,149 (70)

—T—

Thermos Electric Co., Inc., Saddle River, N. J.
Aircraft parts—$85,000 (65)

The Timken-Detroit Axle Co., Detroit, Mich.
Ordnance—$362,878 (65)

Timken-Detroit Axle Co., New Castle, Pa.
Ordnance—$158,142 (65)

Timken-Detroit Axle Co., Oshkosh, Wis.
Ordnance—$83,901 (65)

The Toledo Metal Spinning & Mfg. Co., Toledo, Ohio.
Aircraft parts—$32,530 (65)

J. J. Tourek Mfg. Co., Chicago, Ill.
Aircraft and ordnance parts—$47,700 (75)

Townsend Co., New Brighton, Pa.
Ordnance and aircraft parts—$52,082 (50)

Twin Coach Co., Cheektowaga, N. Y.
Aircraft products—$60,000 (65)

—U—

United Aircraft Corp., Bridgeport, Conn.
Helicopters and parts—$385,000 (65)

United Aircraft Corp., Dallas, Texas.
Aircraft parts—$422,876 (65)

United Aircraft Products, Inc., Dayton, Ohio.
Aircraft parts—$50,515 (80)

United Mfg. Co., New Haven, Conn.
Parts for aircraft testing equipment—$7,380 (80)

United States Motors Corp., Oshkosh, Wis.
Engine generators sets—$41,500 (65)

United States Rubber Co., Eau Claire, Wis.
Military tires—$5,292,700 (65)

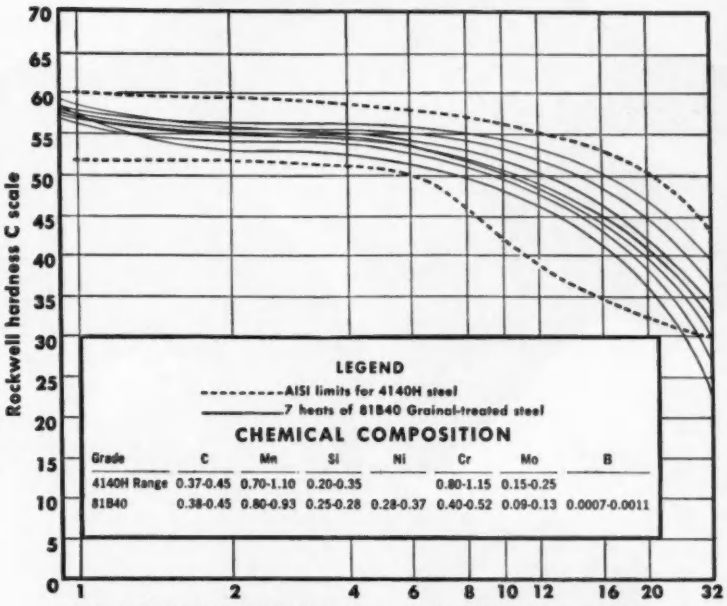
United States Rubber Co., Los Angeles, Calif.
Military tires—$1,247,300 (50)
Military tires—$181,280 (50)
Military tires—$62,403 (65)

U. S. Rubber Co., Fort Wayne, Ind.
Aircraft parts—$189,344 (50)

United States Rubber Co., Detroit, Mich.
Military tires—$160,000 (90)
Military tires—$294,953 (55)
Military tires—$33,173 (65)
Military tires—$1,133,059 (45)

(*Turn to page* 156, *please*)

STANDARD (END QUENCH) HARDENABILITY CHART—



Consistent Hardenability obtained in Boron Steels made with GRAINAL ALLOYS

The most common test for boron steels is measurement of hardenability by the end quench or Jominy hardenability test. Today's steel substitutions are made on the basis of similar hardenability since a reasonable prediction can thus be made of the hardness and strength of a given part.

The curves above show the relationship between the hardenability of a series of seven heats of 81B40 steel and the hardenability band for 4140H steel, which it often replaces. The 81B40 heats were made in one electric furnace shop, and the remarkably consistent hardenability shown by the curves was obtained by the use of Grainal alloy as the means of adding the boron.

Consistent hardenability means consistent strength and hardness after heat treatment, which is the aim of every fabricator. The best proof that the Grainal alloys insure this objective is found in the successful use of three million tons of Grainal-treated steels.

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

MAKERS OF ALLOYS
VANCORAM
CHEMICALS AND METALS

BIGGEST NEWS IN '52...

"A SIZE FOR EVERY NEED"

HYDRAULICALLY BALANCED DESIGN — Reduces wear, improves operation, prolongs life of unit.

FOUR SIZES — Plus interchangeable cam rings for a variety of pump or motor capacities.

CONVERTIBLE — Ready for either pump or motor applications without alterations of any kind.

NEW HIGHLY COMPACT DESIGN — Rugged heavy-duty construction gives the Pump/Motor plenty of stamina for long, hard, continuous duty at 2000 psi. Only three major components.

INTERCHANGEABLE CAM RINGS — Range of capacities as pump or motor thru interchangeable cam rings.

BI-DIRECTIONAL ROTATION — Adjustable for either clockwise or counter-clockwise operation.

WIDEST ADAPTABILITY — Porting location and direction of rotation adjustable to eight different combinations.

THE DENISON ENGINEERING COMPANY, 1212 Dublin Road, Columbus 16, Ohio

.DENISON PUMP/MOTOR

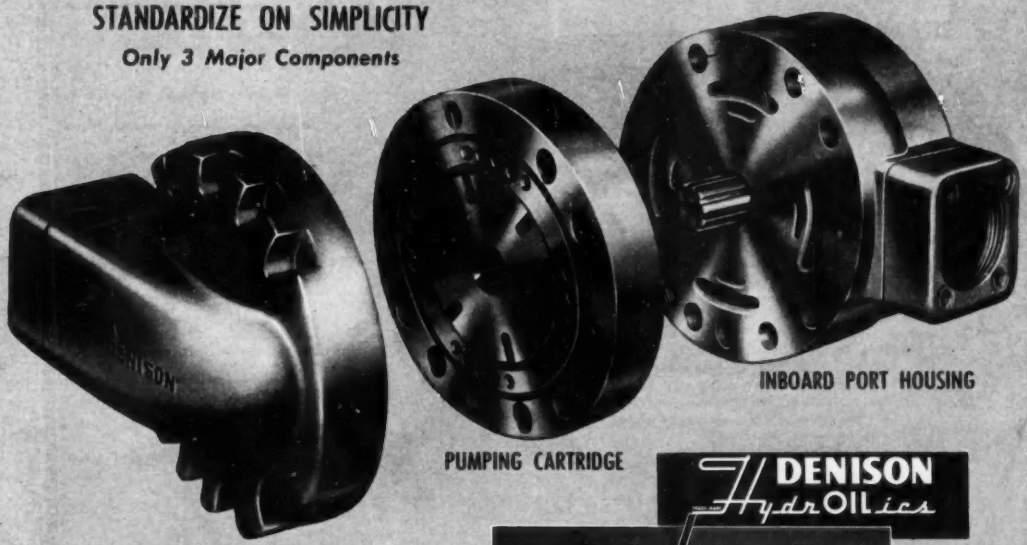
New Dual-Purpose Vane-Type Unit for 2000 psi Continuous Duty

2½ to 70 gpm deliveries as a pump, or torque ratings of 12 to 257 inch-pounds per 100 psi, as a motor

Denison scores a new achievement in dual-purpose pump design. This all-new, vane-type power package is built for *continuous duty* at 2000 psi — and is ready for either pump or motor applications without alterations of any kind! Four sizes are available, with optional cam ring assemblies that permit eleven models, for different pump-volume or motor-torque capacities. Complete hydraulic balance assures longer life through reduced wear. New single stage design and many other features add to the outstanding dual-purpose adaptability of this new Pump/Motor! *Write for Bulletin P-5. The Denison Engineering Co., 1212 Dublin Road, Columbus 16, Ohio.*

STANDARDIZE ON SIMPLICITY

Only 3 Major Components



OUTBOARD PORT HOUSING

PUMPING CARTRIDGE

INBOARD PORT HOUSING

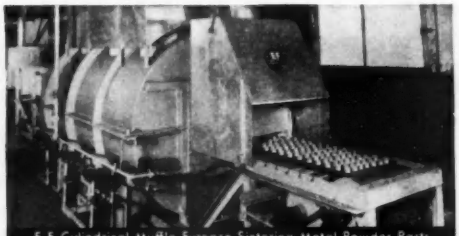
DENISON HydrOILics

PUMP/MOTOR

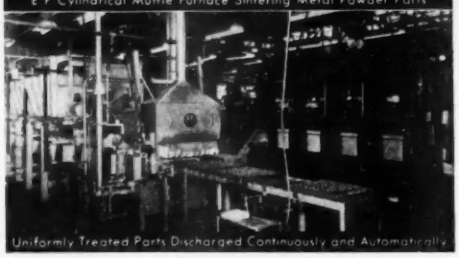
"The Finest Money Can Buy!"

EF

FURNACES *for* processing metal powder products



E F Cylindrical Muffle Furnace Sintering Metal Powder Parts



Uniformly Treated Parts Discharged Continuously and Automatically

Send for Descriptive Literature

● EF furnaces are built in many sizes and types for sintering a wide variety of ferrous and non-ferrous pressed metal powder products — for bonding metal powder to strip, and other processes.

With our long experience and complete manufacturing facilities we are in position to build the size and type to fit *your* specific requirements.

Gas-Fired, Oil-Fired EF and Electric Furnaces
for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. *Salem - Ohio*

Norgren **MICRO-FOG LUBRICATORS**
RELY ON

ACE PRECISION
NYLON BALLS
FOR EXACT CONTROL

SIZES 1/8"—3/4"
TOLERANCES ±.001

C. A. Norgren Co., Denver, Colorado, uses Ace Nylon Balls as feed tube checks in Micro-Fog Lubricators to provide instant oil flow.

Ace Nylon Balls of DuPont Nylon FM #10001 are mass produced to close tolerances giving you the advantages of toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

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ACE NYLON QUALITY

ACE PLASTIC COMPANY
Precision Plastic Fabricators
91-46 VAN WYCK BLVD. ● JAMAICA 2, N. Y.

Defense Facilities

(*Continued from page* 152)

Universal Lubricating Systems, Inc., Oakmont, Pa.
Aircraft parts—$22,888 (50)

Utica Drop Forge & Tool Corp., Yorkville, N. Y.
Aircraft parts—$160,000 (70)

—V—

V. & M. Precision Grinding Co., Los Angeles, Calif.
Aircraft parts—$12,350 (65)

Vendorlator Mfg. Co., Fresno, Calif.
Aircraft parts—$58,243 (75)

Vickers, Inc., Waterbury, Conn.
Hydraulic speed transmissions for ordnance and aircraft—$156,188 (65)

Victor Flush Valve Co., Newark, N. J.
Aircraft products—$123,919 (50)

Vinco Corp., Detroit, Mich.
Aircraft parts—$55,468 (65)

Virkotype Corp., Plainfield, N. J.
Aircraft parts—$3,403 (80)

—W—

Warner Electric Brake & Clutch Co., South Beloit, Ind.
Ordnance—$32,744 (75)

Weba, Inc., Queens Village, N. Y.
Aircraft parts—$25,351 (80)

Robert L. Welch, Lakewood, Ohio.
Aircraft products—$2,665 (65)

Wemac Co., Inglewood, Calif.
Aircraft parts—$3,122 (80)

Western Gear Works, Lynwood, Calif.
Aircraft parts—$24,452 (70)
Aircraft parts—$26,134 (70)
Aircraft parts—$4,062 (70)
Gears for aircraft parts—$62,000 (65)

Wichita Engineering Co., Wichita Falls, Tex.
Aircraft and ordnance parts—$20,207 (75)

Whippany Products Co., Inc., Whippany, N. J.
Aircraft parts—$30,785 (65)

Whirlpool Corp., St. Joseph, Mich.
Aircraft and ordnance parts—$103,068 (70)

Wm. R. Whittaker Co., Ltd., Los Angeles, Calif.
Aircraft parts—$347,351 (65)
Valves for military aircraft—$52,895 (65)

Willard Bronze Co., Cincinnati, Ohio.
Aircraft parts—$124,442 (65)

Worth Mfg. Co., Los Angeles, Calif.
Aircraft parts—$25,302 (80)

Wolverine Diesel Power Co., Detroit, Mich.
Engine generator—for aircraft—$70,555 (65)

—Z—

Zul Machine Works, Inc., Lindenhurst, L. I., N. Y.
Aircraft parts—$39,962 (80)

J. Zagora Machine & Gear Co., Inc., Charlotte, N. C.
Aircraft parts—$97,583 (70)

Power for Power-Steering

EATON ROTOR PUMPS

with Flow-Control

As a pioneer in the development of pumps with flow-control for hydraulic power-steering, the Eaton Pump Division offers unequalled facilities in both design and production in this highly specialized field. The Eaton high-speed power unit provides the desirable advantage of small, compact design. If you are considering this important addition to the ease, convenience, and safety of modern motoring, there are distinct benefits in permitting our engineers to work with yours in the early design stages.

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

Pump Division

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$70,000.00 in savings every year in Tool and Die Repair alone from only two Thomas Metalmasters in the world's largest cash register manufacturing plant.

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Terrific drop in scrap loss per man from $35.00 per man to $8.00 per man with the use of 14 Thomas Metalmasters in the world's largest Aircraft engine manufacturing plant.

With the Thomas Metalmaster Disintegrator you'll actually remove broken tap cores in minutes with no fuss—no bother—no toil . . . PLUS the fact that you'll not injure or effect the temper of the workpiece.

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There's a factory trained technical engineer in your area ready to give you a free demonstration in your own plant

Contract Awards

(*Continued from page* 132)

—O—

The Oilgear Co., Milwaukee, Wisc.
Auto parts
Automotive parts

The Oliver Corp., Chicago, Ill.
Main fuselage—$512,000

Oshkosh Motor Truck Inc., Oshkosh, Wisc.
Snow plows, truck mounted—3 ea.—$32,-081

—P—

Pacific Div. Bendix Aviation Corp., N. Hollywood, Calif.
Bladder assy.—$72,310
Misc. assys.—$50,000

Pacific Tire & Rubber Co., Oakland, Calif.
Tires & tubes—$10,000 ea.—$487,300

Pastushin Aviation Corp., Los Angeles, Calif.
Tank assy.—$1,375,000

Pennsylvania Rubber Co., Mansfield, Ohio
Tires—over $250,000

Pesco Products Div., Borg-Warner Corp., Bedford, Ohio
Hydraulic pumps—$33,660
Maintenance parts—$97,763

Pfaff & Kendall, Newark, N. J.
Mast—940 ea—$200,972

Phaostron Company, South Pasadena, Calif.
Generator—12594—$305,993

Prestyle Mfg. Co., Detroit, Mich.
Combat vehicle parts—58—$54,665

Products Co., Detroit, Mich.
Tank & combat vehicle parts—4200 ea.—$68,588

—R—

Radioplane Co., Van Nuys, Calif.
Target aircraft—$4,543,500

Raybestos Div., Stratford, Conn.
Tank & combat vehicle parts—12200—$32,940

Reo Motors, Inc., Los Angeles, Calif.
Repair parts—188 items—$10,318
Repair parts—359 line items—$27,211
Parts—267 line items—$14,012

Reo Motors, Inc., Lansing, Mich.
Trucks—over $250,000

Republic Aviation Corp., Farmingdale, L. I., N. Y.
Airplanes—$1,600,000
Components—$500,000

Republic Steel Corp., Bolt & Nut Div., Cleveland 13, Ohio
Hardware—5000000 ea.—$29,245

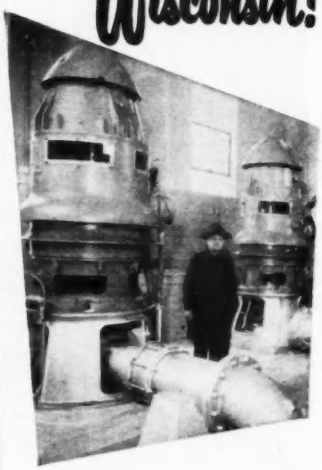
Reynolds Metals Co., Louisville 1, Ky.
Hardware—31993 lbs.—$12,369

Rochester Products, General Motors Corp., Rochester, N. Y.
Maintenance parts—various—$138,455
Maintenance parts—various—$51,551

Marlin Rockwell Corp., Jamestown, N. Y.
Bearings—$30,000 ea.—$26,700

(*Turn to page* 160, *please*)

ONE OF THE *Finest In* *Wisconsin!



*** for the city of wauwatosa**

Layne points with pride to a recent deep well and four vertical turbine pump installation for the city of Wauwatosa, Wisconsin. From an overall capacity, control flexibility, high efficiency, smoothness of operation and modern engineering, this is one of the very finest water supply plants in the state. The 1750 foot deep well, cement grouted from top to bottom, produces 1650 gallons of water per minute against a dynamic head of 145 feet. All water for the city of Wauwatosa is 100 percent from Layne pumps.

This installation is typical of Layne's all inclusive services. Everything from the original test borings to the well drilling, sand screen and pumps and motors, was handled complete by Layne's own crews operating under the direct supervision of Layne engineers. It is such splendid services and outstanding results that Layne and Layne alone in the Nation is in a position to offer cities, factories, mills and plants of all kinds whether the need is for a single-unit or for many. For late catalogs, bulletins etc., address

LAYNE & BOWLER, INC.
General Offices, Memphis 8, Tenn.

Layne

WATER WELLS
VERTICAL TURBINE PUMPS
WATER TREATMENT

...AND A NEPTUNE
SPREADS ITS WINGS

Lockheed Engineering Turns to Chiksan to Turn the Trick

THE SUPER CONSTELLATION, newest in Lockheed's fleet of transports, and the Navy's newest Neptune, tough-taloned bird of prey, are both evidence that we can "Look to Lockheed for Leadership". Both rely upon Chiksan Ball Bearing Swivel Joints to turn corners in their hydraulic systems — to flex their metal joints.

Chiksan takes such tough assignments in its stride. For Chiksan Hydraulic Joints are made for jobs where precision is the rule. Although used in 1, 2, and 3,000 psi systems these joints are tested by Chiksan's Research and Development Department in the presence of bitter cold and searing heat — under pressures as high as 10,000 psi and under the relentless driving force of continual use.

Whether the job is to keep planes flying or industry's life-blood flowing — to hasten manufacturing process and expedite transportation — to feed the veins of industry and speed the course of science and invention, there you will find Chiksan applications — Ball Bearing Swivel Joints tooled to exacting tolerances, flexing the muscles of Progress — adding sinew and flexibility to the flow of gas, liquid and modern living.

Tested according to military specification MIL-J-5513 (AN-J-10) Chiksan Aero-Hydraulic Swivel Joints were proved more than adequate for use in Aircraft Hydraulic Systems. Above, they are shown as installed in the landing gear of the U. S. Navy's newest Neptune anti-submarine patrol bomber.

Chiksan Ball Bearing Swivel Joints have a part in bringing planes to a stop. Here, too, the liquid of hydraulic systems must flow in uninterrupted circuits. Chiksan surpasses all standards set down for both civilian and military requirements—serves in landing mechanisms of Super Constellations, Neptunes and many other planes.

These safe feather-touch landings of Lockheed's new Super Constellation can be partly accounted for by the smooth, sure operation of the well-engineered hydraulic system using Chiksan Ball Bearing Swivel Joints.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

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• If plant, process or product needs speeding or improving — if flow of liquid or gas or flexibility of metal is a factor, call upon the Research and Development Division of Chiksan. There's probably a better method awaiting your service that Chiksan has proved in performance or can devise for your special need.

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THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN., U. S. A.

Contract Awards

(*Continued from page* 158)

Roller Bearing Co. of America, Trenton, N. J.
Hardware—31000 ea.—$39,967

Romeo Div., Lear, Inc., Elyria, Ohio
Pump, water injection—$117,118
Pumps—$170,790

H. Z. Rosenberg & Co., Buffalo, N. Y.
Aircraft parts & equipment—$26,907

Ryan Industries, Inc., Detroit, Mich.
Indicator—8219—$1,075,265

—S—

Sampsel Time Control Inc., Spring Valley, Ill.
Power unit—3036—$2,491,445

Jerry Shane & Associates, Los Angeles 17, Calif.
Automotive repair parts—36 line items—$12,959

Sheller Mfg. Corp., Portland, Ind.
Motor vehicle parts—7500 ea.—$32,287

The Sperry Corp., Great Neck, N. Y.
Maintenance parts—6798 ea.—$63,971

Standard Coil Products Co., Inc., Kollsman Instrument Corp., Elmhurst, N. Y.
True airspeed & Mach. no. computer—$32,258

Standard Electrical Products Co., Dayton, Ohio
Generator—2500—$60,875

Stewart Warner Corp., Chicago 14, Ill.
Motor vehicle parts—10126 ea.—$28,566

Sun Electric Corp., Chicago, Ill.
Generator—$127,259

Sunbeam Corp., Chicago, Ill.
Indicators—3012 ea.—$144,525

—T—

Taylor Forge & Pipe Wks., Chicago, Ill.
Engine rings—550,000

Thompson Products, Inc., Cleveland, Ohio
Maintenance—$90,136
Pumps for various aircrafts—235 ea.—$101,379
Pumps—over $250,000

Timken Roller Bearing Co., Canton 6, Ohio
Hardware—119500 ea.—$127,294

Tulsa Aircraft Parts Co., Tulsa, Okla.
Aircraft parts—

C. K. Turk Corp., South Bend, Ind.
Combat vehicle parts—1700—$39,423

—U—

Union Drawn Steel Div., Republic Steel Corp., Massilon, Ohio
Hardware—928592 lb.—$73,054
185539 ft.

United Aircraft Corp., Hamilton Standard Div., East Hartford, Conn.
Kit assy. for propeller assy—over $250,000
Propeller tools—437 ea.—$31,851
Maintenance parts—175799 ea.—$60,550

(*Turn to page* 162, *please*)

Help Lower Unit Production Cost to Meet Competition Profitably . . .

Simplified screw driving, bolt setting and nut running mean lower unit cost. This is possible with Pheoll products because they are inspected through all manufacturing steps from coil wire or bar stock to the finished product.

All threads, whether rolled or cut, are carefully gauged to American Standards. Screw and bolt heads are formed, slotted or recessed to meet rigid engineering requirements. Overall quality of the finished product is uniformly high. Precision head formation on all bolts as well as engineered slots and recesses in all screws means less wrench and driver slippage.

Pheoll engineers will recommend the correct type, size and finish of standard or special screws, bolts and nuts for your needs.

WHAT PHEOLL INDUSTRIAL FASTENERS MEAN TO YOU	CHECK THESE PHEOLL PRODUCTS FOR YOUR NEEDS
● Simpler and speedier assemblies.	☐ Machine Screws
● Less worker fatigue — more units.	☐ Sems
● Improved product appearance.	☐ Tapping Screws
● Added latitude in product design.	☐ Square Head Set Screws
● Immediate and dependable source for standardized, interchangeable screws, bolts and nuts especially suited to mass production.	☐ Threaded Cutting Screws
	☐ Cap Screws
	☐ Phillips Recessed Head Screws
	☐ Machine Bolts
	☐ Wing Nuts
	☐ Knurled Nuts

Write for literature

Pheoll MANUFACTURING COMPANY
5700 ROOSEVELT ROAD
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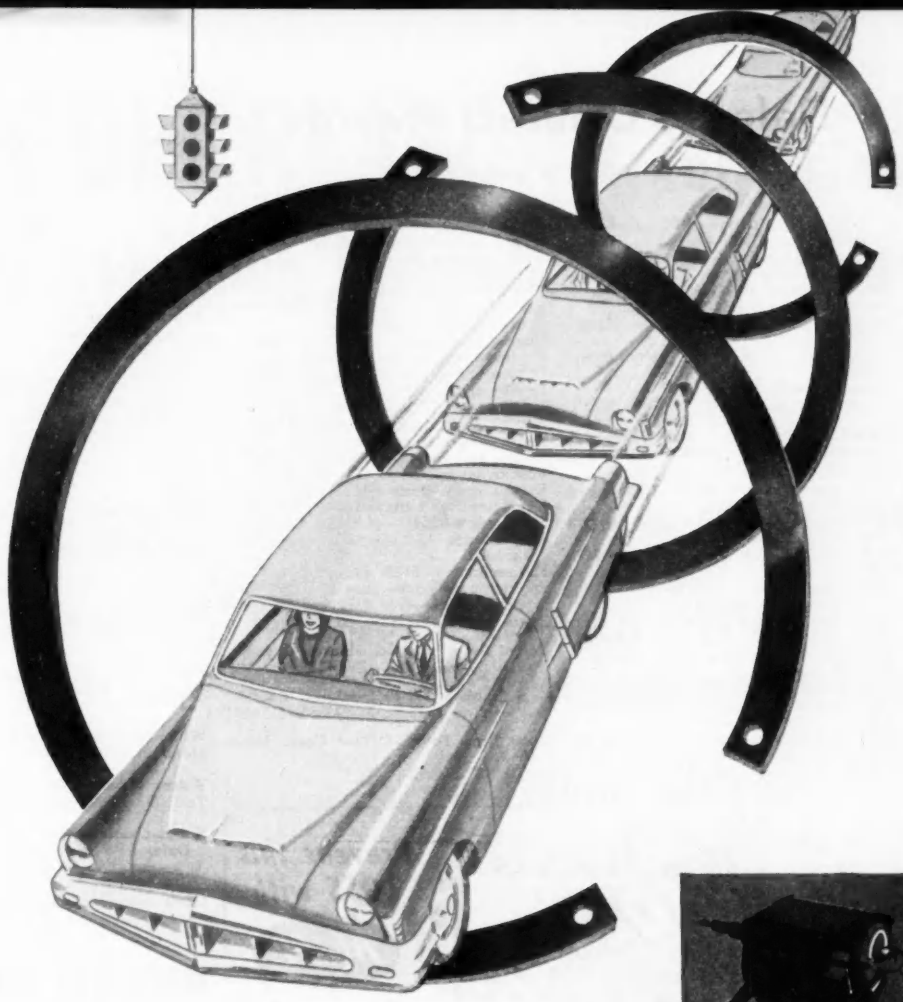
SCREWS • BOLTS • NUTS
Industrial Fasteners and Holding Devices



Reliance snap rings lock retainer plate, gear control plate, blocker assembly, and pawl accurately into overdrive unit.

Rear main bearing locked into position by Reliance snap rings in overdrive unit.

RELIANCE SNAP RINGS REDUCE COST of Assembling Overdrive

Overdrive in millions of American cars brings greater convenience and operating economies to the motoring public. Through the use of Reliance Snap Rings in these overdrive assemblies manufacturers enjoy greater production efficiencies and lower costs. Throughout industry, Reliance Snap Rings have cut assembly time – eliminated machining operations and reduced final unit costs. You can profit through such economies in your own production – now. Reliance Snap Ring engineers will welcome an opportunity to review your assembly parts or drawings for snap-ring application recommendations. For complete information write, wire or call your nearest Reliance sales office today.

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SALES OFFICES: NEW YORK • CLEVELAND • DETROIT • CHICAGO • ST. LOUIS
SAN FRANCISCO • MONTREAL

Defense Contract Awards

(*Continued from page* 160)

Propeller spare parts—12454 ea.—$36,000
Propeller tools—1638—$62,055
Propeller spare parts—over $250,000
Propeller spare parts—120780—$212,464
Maintenance parts—120946—$197,753
Propeller spare parts—68394—$100,000
Maintenance & overhaul parts—38199—$86,613
Maintenance & overhaul parts—8036—$26,009
Propeller tools—231—$44,561
Propeller tools—70—$58,059

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford 8, Conn.

P&W engine tools—982 ea.—$33,606
P&W engine spare parts—38350 ea.—$44,580
P&W engine parts—45 sets—$26,041
P&W spare parts—over $250,000
P&W maintenance parts—255 ea.—$47,-648
P&W spare parts—over $250,000
Spare parts—over $250,000
Spare parts—over $250,000
P&W maintenance parts—over $250,000
Stand: for use on model R2800 engines—77 ea.—$66,220
P&W engine spare parts—46024—36,501
P&W engine spare parts—365 ea.—$95,-962
P&W maintenance parts—131770—$97,695
Engine spares—over $250,000
Engine spares—6074—$103,058
Engine spares—over $250,000
Engine spares—over $250,000
Misc. parts—11348—$88,294
Engine spare parts—20342—$25,453
Overhaul spare parts—over $250,000
Engine spare parts—over $250,000
Aircraft parts—10592—$27,963
Engine spare parts—157777—$200,000
Engine spare parts—over $250,000
Engine spare parts—69934—$68,734
Engine spare parts—1858—$38,296
Misc. parts—65808—$107,761
Engine spare parts—106428—$78,006
Engine spare parts—over $250,000
Engine spare parts—33388—$214,941
Special jet engine tools—1568—$64,104
Engine spare parts—55533—$62,133
Misc. parts and assys.—over $250,000
Spare parts—36971—$66,548
Maintenance & overhaul parts—over $250,000
Engine spares—6153—$48,895
Engine spare parts—over $250,000
Propeller parts—over $250,000
Spare parts—over $250,000

United Auto Parts Co., Kansas City, Mo.

Hardware—over $250,000

U. S. Rubber Co., Philadelphia, Pa.

Sell sealing fuel hose—243650—$124,671

Utica Drop Forge & Tool Corp., Utica, N. Y.

Blades—$1,302,000

—V—

Vickers, Inc., Detroit, Mich.

Hydraulic pumps—$32,500
Pump & motor assys.—354 ea.—$107,183

—W—

Waco Aircraft Co., Troy, Ohio

Dome assys., turret—100—$105,738

Warner Gear Div., Borg Warner Corp., Muncie, Indiana

Tanks—3216 ea.—$72,565

Wayne Foundry & Stamping Co., Detroit, Michigan

Tank & combat vehicle parts—500—$143,-175

West Coast Glass Dist., Los Angeles, Calif.

Automotive repair parts—5 line items—$10,102

Westinghouse Electric Corp., Dayton, Ohio

Generators—1289—$596,204

Westinghouse Electric Corp., Aviation Turbine Div., Philadelphia 13, Pa.

Spare parts—71—$28,325
Maintenance parts—30260 ea.—$39,036
Regulator control panel assy.—273 ea.—$49,047

White Machine Works, Eau Claire, Wisc.

Motor vehicle parts—17800 ea.—$52,688

Wilcox Machine Co., Inc., Sarasota, Fla.

Tank & vehicle parts—48900 ea.—$53,238

Willys-Overland Motors, Inc., Toledo 1, Ohio.

Automotive repair parts—104 line items—$13,695
Motor vehicle parts—7200—$34,550

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Turn out more work, easier, faster, with lightweight, vibrationless tools that reduce fatigue to an absolute maximum. Typical of Mall compactness and precision in pneumatic tools is this No. PG-K1030L Lever Throttle Die Grinder, weighing only ¾ of a pound and easily held in the palm of the hand. With a guaranteed speed of 30,000 rpm. and a maximum of .0015 runout at the collet, this Mall Pneumatic Die Grinder assures accuracy, precision and ease of operation.
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MACHINERY INDUSTRIES

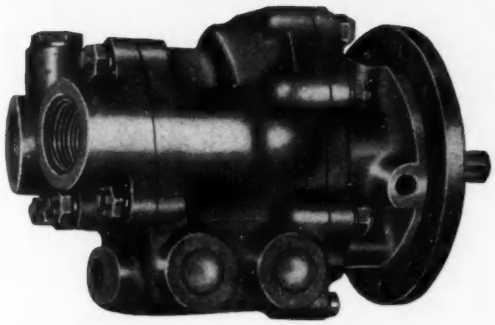
(*Continued from page* 57)

On machining titanium, Mr. Ernst stated that the difficulty seems to be that the titanium is readily soluble in cutting tool materials at high temperatures. These temperatures are obtained at microscopic points along the cutting edge of the tool, so therefore titanium readily builds up on these portions and in a relatively short period reduces the tool's efficiency.

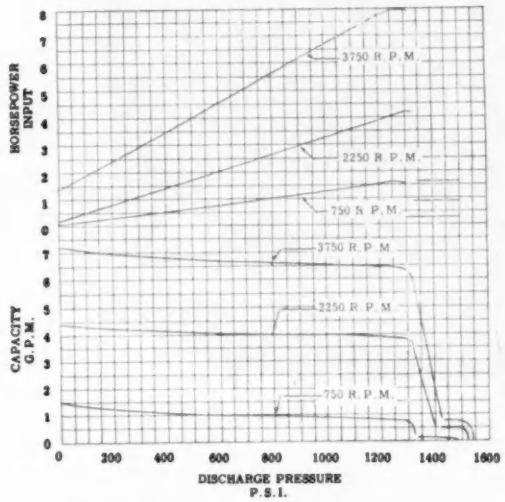
Company Purchased

It has been annqunced that Barber-Colman Co., Rockford, Ill., will purchase the principal assets of Wheelco Instruments Co. of Chicago. Plans are to continue current operations in Chicago until such time as manufacturing facilities can be gradually transferred to Rockford without interruption of shipments.

SIX BIG REASONS for using Pesco unloading hydraulic gear pumps:



Capacity: 2 g. p. m. @ 1500 r. p. m. @ 1250 p. s. i. Maximum operating pressure 1500 p. s. i. Weight: 8.9 lbs. approx.



This chart shows performance characteristics of Pesco Unloading Pump. Write for detailed engineering drawings and performance data.

1. Fewer parts
2. Easier to recondition
3. Longer service between overhaul periods
4. Lighter weight
5. Lower initial cost
6. Lower maintenance costs

The Pesco *Unloading* Hydraulic Gear Pump is the most economical and dependable pump built for applications where a variable volume of hydraulic fluid is required. This Pesco pump automatically adjusts flow of fluid to increasing and decreasing demands of the hydraulic system. It incorporates a main and a pilot pump as well as unloading and relief valves in one unit. And it's "pressure loaded"—Pesco's exclusive, patented design principle that assures extremely high operating efficiencies over a long, trouble-free pump life because it *automatically* compensates for wear. For the complete story write today.

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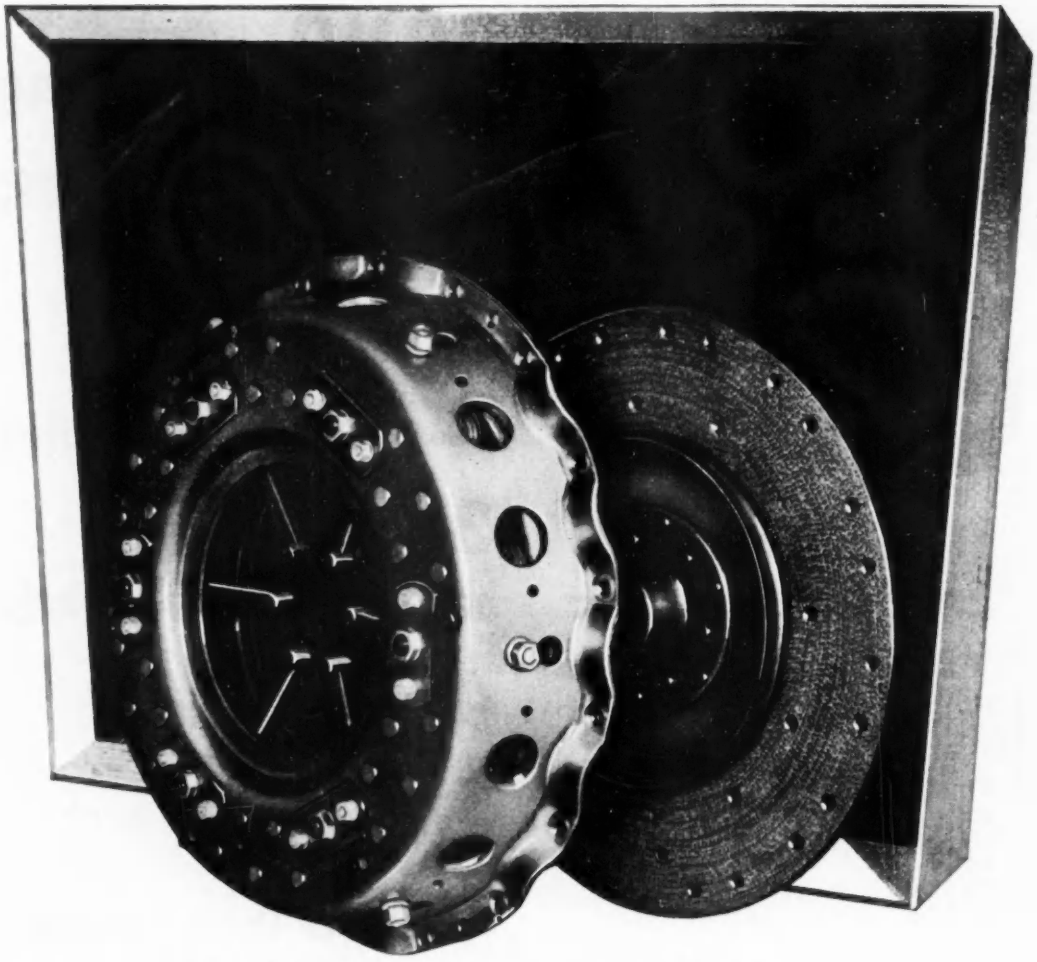

a GIANT in Dependability

Long clutches provide smooth, positive power transmission for automotive vehicles. In every type of "proving ground"—city streets, byroads and highways, farm lands and military terrain, vehicle operators truly have found the Long clutch a giant in dependability.

Since 1922, Long clutches have equipped millions of passenger cars, trucks, buses, tractors and military vehicles.

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Rugged Enamel stands up!
Road Builder stands out!

Caterpillar DW21 Tractor and Scraper in workout at proving grounds of Caterpillar near East Peoria, Illinois. An R-M enamel has to be good to stand up here!

Caterpillar Machines catch the eye with R-M "Hi-way" Yellow!

Over the hills and over the highways, Caterpillar road builders *stand out!* Finished in bright, bold and durable R-M "Hi-way" Yellow enamel, this powerful equipment presents an outstanding example of how an R-M Color actually *goes to work* for the product on which it is used. As a *very durable enamel,* it prolongs product life; as a *highly visible color,* it helps prevent accidents; as *a bright color,* it draws the eye to Caterpillar equipment; and as *a consistent color,* it promotes equipment sales through easier identification with the product name. R-M lacquers, enamels and undercoats are used on the finest passenger cars in America, on hard working farm and earth-moving equipment, on giant Diesel locomotives and many others. Ask us how an R-M color *can go to work for your product!*

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Sirvene is the name for Chicago Rawhide's scientifically compounded elastomers (synthetic rubber) which withstand extreme heat or cold, dryness or excessive moisture, oil, water, chemicals or any other conditions where ordinary pliables fail.

Whatever your need, Sirvene research and engineering will create a special design, develop a new compound, then mass-produce the necessary part to your specifications with micrometric accuracy. You'll have the *exact* degree of flexibility, hardness, resistance to temperatures, fluids, gases, abrasion and wear, or other qualities you may require.

On land, sea and air, Sirvene is serving in thousands of critical and difficult situations. It can do the same for you.

CHICAGO RAWHIDE MANUFACTURING CO.

1310 Elston Avenue **SIRVENE DIVISION** Chicago 22, Illinois

The cooperative research and engineering services which C/R has provided in producing special Sirvene synthetic rubber parts for leading manufacturers, are also available to you. We will be pleased to send you any further information you wish. Brochure on request.

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SCIENTIFICALLY COMPOUNDED ELASTOMERS

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Mechanical Leather Products

Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.

PERFECT *Oil Seals*

C/R seals are used in more motor vehicles, farm implements and industrial machines than any other shaft-type sealing device.

Representatives in These Principal Cities

Boston • New York • Syracuse
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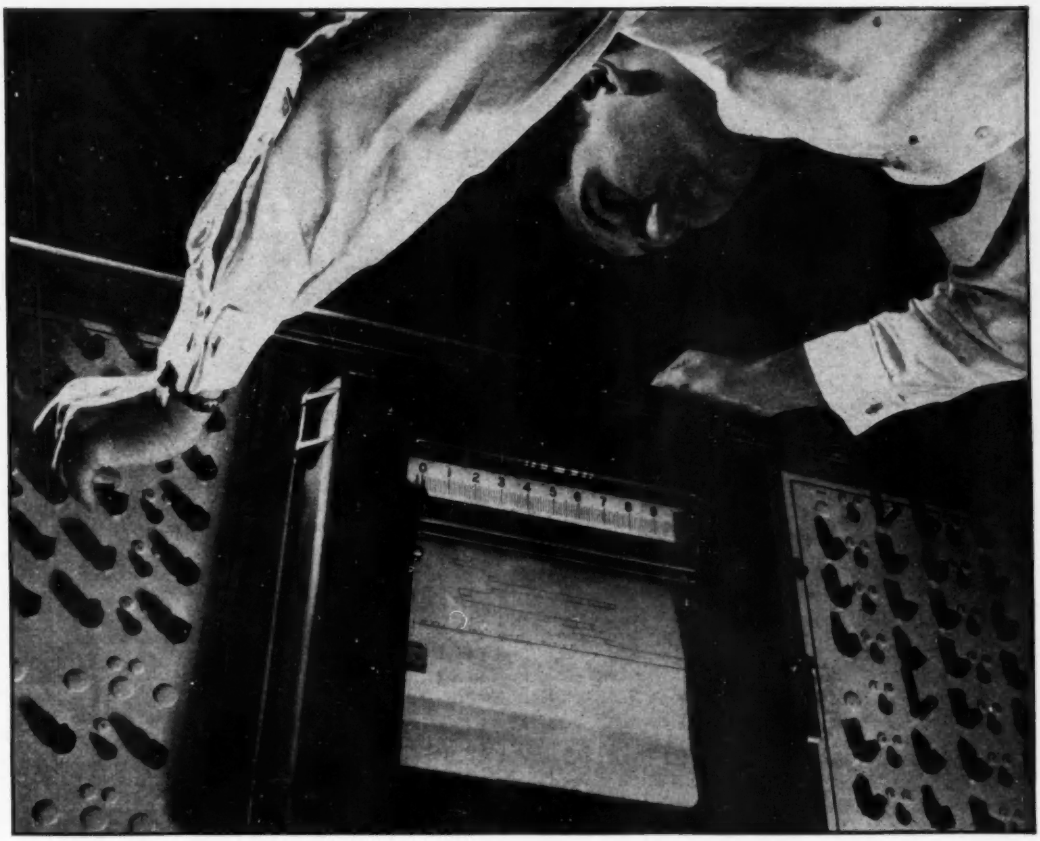


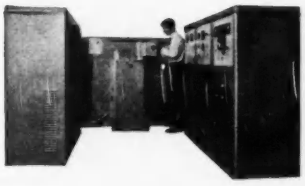
RIGHT from the start . . .

Expert scientific control makes ALUMICAST castings faultless

There's no guesswork done at ALUMICAST. Every step from ingot to the finished casting is subject to scientific tests and controls to assure production of uniformly high quality castings. Right from the start every piece will meet your specifications.

No matter where you are located, you will find ALUMICAST a quick and dependable source for aluminum or magnesium castings. You are cordially invited to consult us relative to your civilian or defense needs.

ALUMICAST CORPORATION, 1521 N. Kilpatrick Avenue, Chicago 51, Illinois.

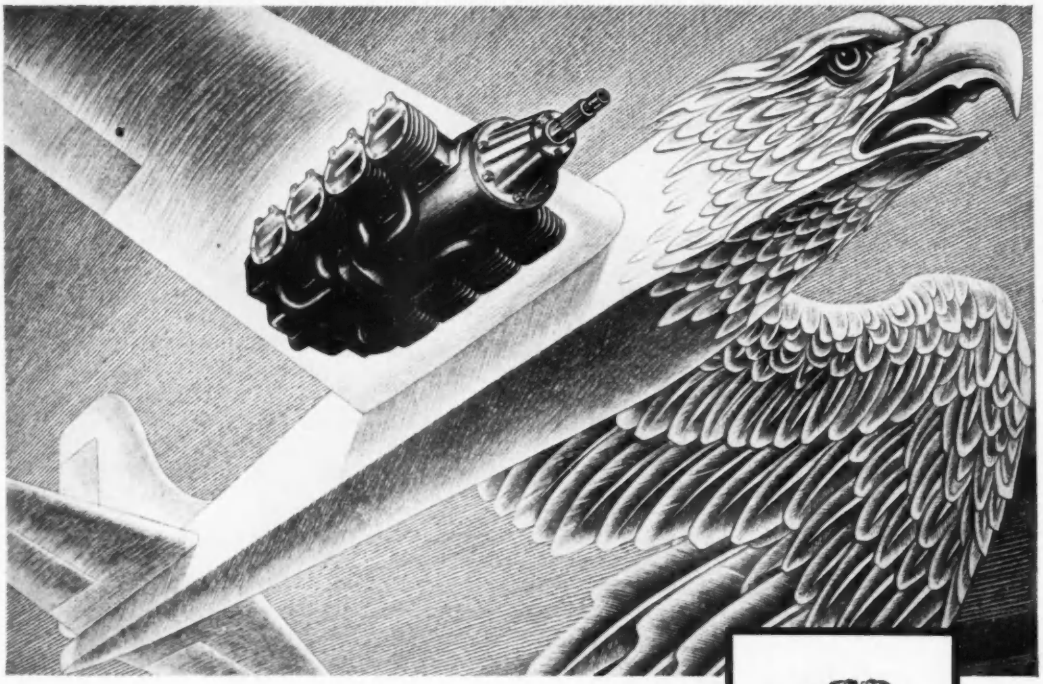


Illustrations above show the Quantometer which provides our laboratory technicians with a graphically recorded analysis of sixteen different elements—in less than three minutes. This assures the correct casting alloy composition in every "heat". You benefit because of expert scientific control ("E.S.C.").

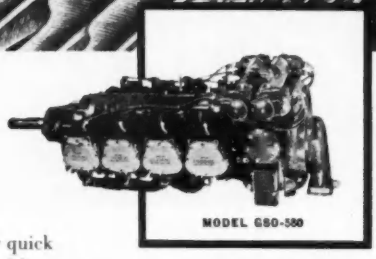
ALUMICAST

ALUMINUM and MAGNESIUM PERMANENT MOLD and DIE CASTINGS

"E.S.C." EXPERT SCIENTIFIC CONTROL



There's a new "beat" in this eagle's heart



A versatile aircraft engine with reserve power for quick take-offs, military hedge-hopping, more lift! *Geared* for smoother operation; "*opposed*" *design* for practical compactness; *supercharged* for greater power; the only 400-horsepower air-cooled engine being produced! That's the unique power plant now available through Lycoming research and precision production.

Whether you require air-cooled power for aircraft or ground applications—or whether your need is precision machining, product development, or high-volume production—Lycoming offers extensive facilities and well-rounded experience. Long famous for its aircraft engines, Lycoming also meets the most exacting and diverse requirements in many fields, both military and industrial.

Whatever your problem—look to Lycoming!

To put more "thrust" in aircraft calls for an engine with ready reserve power. Now, with a new "heart"—400-horse size—

Lycoming precision production gives extra power for peak performance.

AIR-COOLED ENGINES FOR AIRCRAFT AND INDUSTRIAL USES • PRECISION-AND-VOLUME-MACHINE PARTS • GRAY-IRON CASTINGS • STEEL-PLATE FABRICATION

LOOK TO **LYCOMING** FOR RESEARCH FOR PRECISION PRODUCTION

LYCOMING-SPENCER DIVISION, WILLIAMSPORT, PA.
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.

AVCO MANUFACTURING CORPORATION

Morse *means* Timing Chains

In the last 38 years, Morse has worked closely with top automotive engineers in the development of timing chains and in the design of timing chain drives.

The exceptional performance of over 54 million Morse Timing Chain Drives stems directly from that collaboration.

In knowledge and skill that can be focused on timing-drive problems and in the mass-production of precision-built timing chain drives, there is one acknowledged leader. It's Morse. That's why M = TC, Morse *means* Timing Chains.

SEND FOR FREE PRINT

Burstall and Hill: English steam wagon, 1824.

This is one of a series of old prints of old machines (and ways of power transmission) that will appear in future Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.

MORSE

MECHANICAL
POWER TRANSMISSION
PRODUCTS

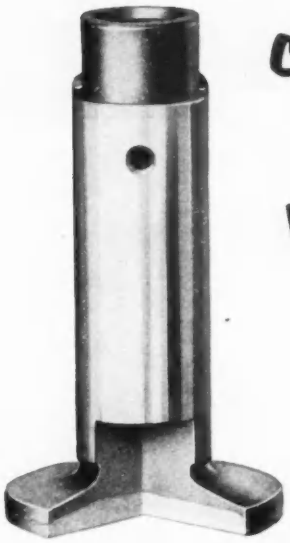
PRODUCTS OF BW BORG-WARNER

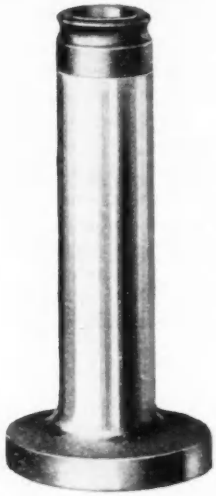
MORSE CHAIN COMPANY

for modern high-speed engines

Eaton Tappets

combine strength, light weight, wear resistance





The higher tappet loads in modern engines require extremely hard tappet faces and light weight bodies to insure proper functioning of the valve train. Eaton tappets combine these important advantages. A unique puddling method, perfected by Eaton over a period of years, produces exceedingly hard white iron tappet faces on steel bodies, providing high load-carrying capacity of face combined with desired lightness of the steel body. With this combination of superior strength, light weight, and wear-resistant face, these tappets meet the exacting requirements of today's and tomorrow's engines.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

EATON MANUFACTURING COMPANY

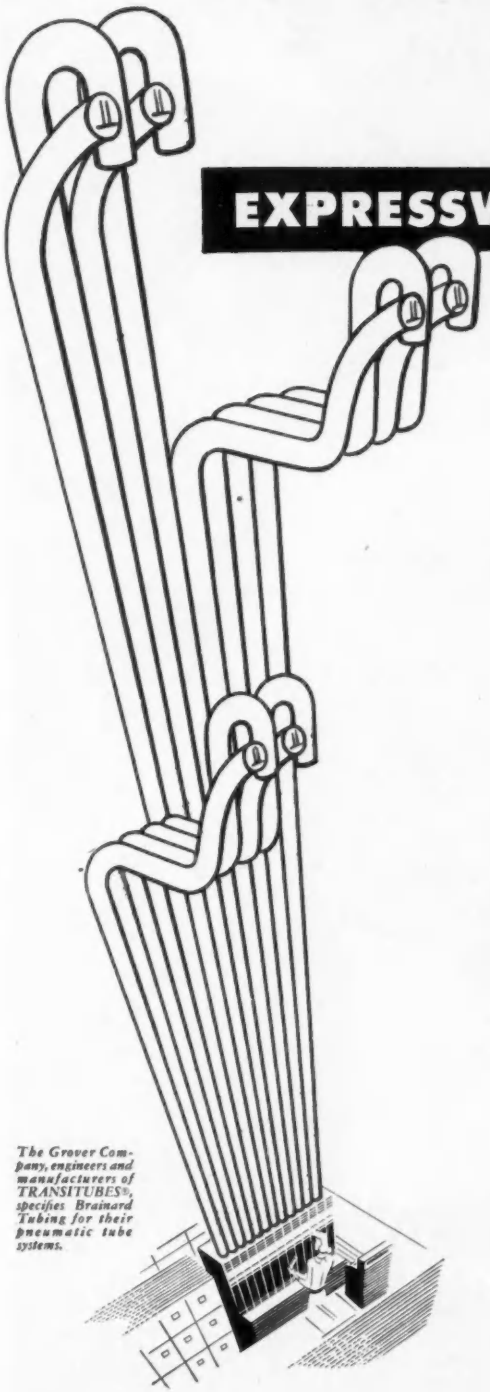
CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

another job for **Brainard** TUBING

EXPRESSWAY FOR HOT MAIL



The Grover Company, engineers and manufacturers of TRANSITUBES®, specifies Brainard Tubing for their pneumatic tube systems.

● Precision is important in pneumatic tube systems . . . a big reason why Brainard Electric-welded Tubing is so widely used for this application.

Brainard Tubing is produced to close tolerances, with a smooth inside finish. In straight or bent sections, the bore is a smooth expressway for the carrier cylinders.

Strength is uniform. Sections can be joined by a variety of methods, simplifying the work of both designer and fabricator. And . . . electric-welded tubing is far more economical than other types.

Brainard's integrated production facilities assure quality control throughout manufacture . . . from ore to finished tubing. Depend on Brainard service for *your* needs.

EASY TO FABRICATE

Brainard tubing is a uniform product made to close tolerances. Has good machining qualities and finish can be supplied as specified. Easily fabricated—can be beaded, expanded, swaged, spun, flanged, upset, grooved, fluted, flattened, tapered, and otherwise formed. Supplied straight or fabricated, sizes ½" to 4" O.D.; .025 to .180 gage.

Fast delivery on certain sizes. For further information or catalog, write Brainard Steel Division, Dept. W-4, Griswold Street, Warren, Ohio.

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SHARONSTEEL
STEEL DIVISION
SHARON STEEL CORPORATION

WARREN, OHIO

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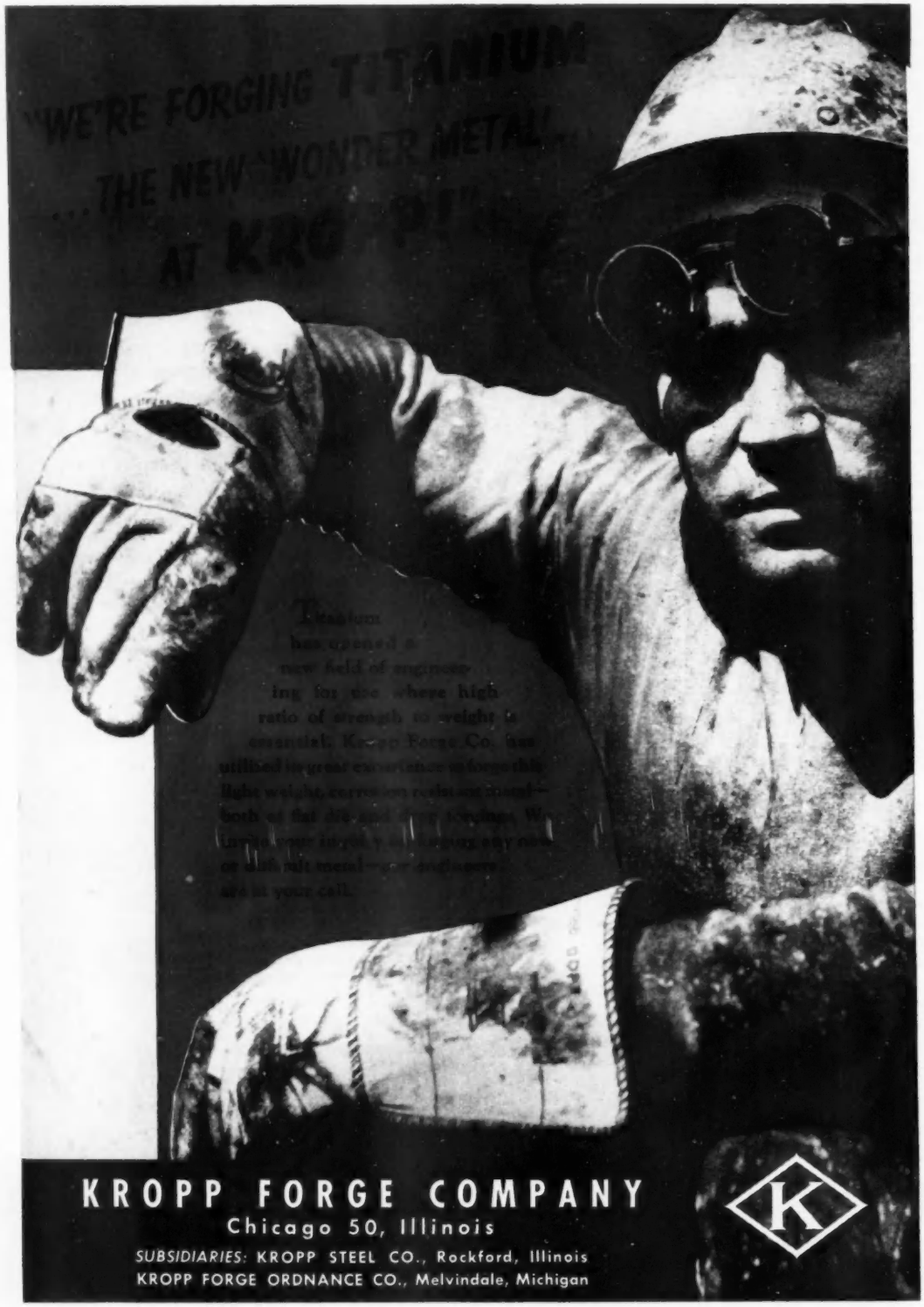
"WE'RE FORGING TITANIUM
...THE NEW WONDER METAL
AT KRO
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essential. Kropp Forge Co. has
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TIME SAVERS IN THREE SIZES

CLECO AIR-OPERATED SCREW DRIVERS AND NUT RUNNERS

One of these air-operated tools can cut your assembly costs by driving screws or running nuts faster. Each tool is tailored to the requirements of the job, each is light and easy to handle. Ask your Cleco Field Engineer for a demonstration.

For No. 8 Machine Screws

THE CLECO A-1 PNEUMATIC REVERSIBLE SCREW DRIVER

Scarcely larger than a fountain pen, this 9½-ounce tool is ideal for driving small screws and other fasteners.

For 3/8" Bolts and Nuts

THE CLECO A-3 PNEUMATIC REVERSIBLE IMPACT WRENCH

This powerful tool is one of the most rugged and trouble-free ever developed. It is light, compact and well balanced. Yet it gives the powerful torque necessary for positive tightening of bolts and nuts.

For 1/4" Bolts and Screws

THE CLECO 1RSPC REVERSIBLE SCREW DRIVER

This production tool features the new Cleco adjustable clutch with sturdy slip-impact action for final tightening. Finders and bits are easily changed without dismantling any part of the tool.

CLECO AIR TOOLS

DALLETT

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of the REED ROLLER BIT COMPANY, 5125 Clinton Drive, Houston 20, Texas, U.S.A.

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3331

Speed Nut Savings Stories

Saving Weight

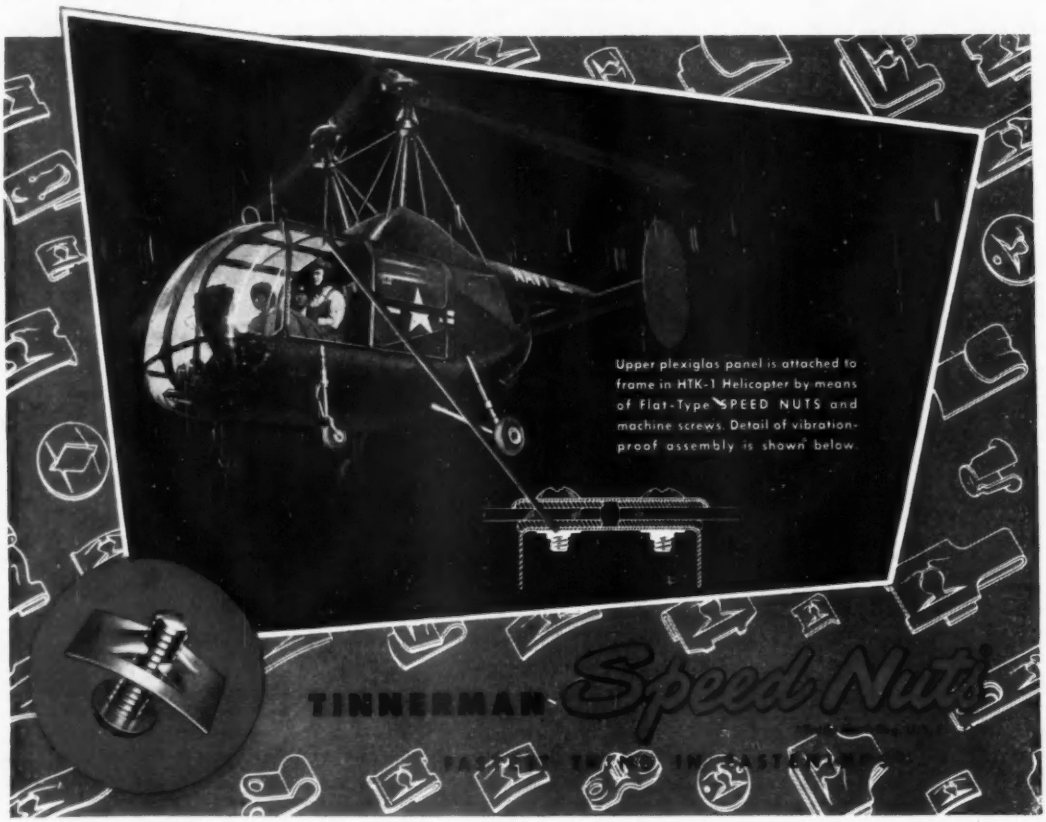
TO SAVE MORE LIVES

How SPEED NUTS made important weight savings attaching plexiglas panels in Kaman Helicopter.

Let the engineers at Kaman Aircraft Corp., Windsor Locks, Conn., tell you how Flat-Type SPEED NUTS performed for them. "We found that lightweight SPEED NUTS provide a large bearing surface which eliminates the need for flat washers under nut. *They reduce the weight up to .31 pounds per hundred when replacing other lock nuts, not including savings on weight of washers.*

"Only one part to handle in assembly means faster, easier attachments. SPEED NUTS are retained in screw-receiving position by finger-tip pressure—no wrench needed to pull down NUTS. *These advantages add up to savings of approximately .15 man-hours per hundred fasteners.*"

If you would like to hear similar savings reports from *your* engineers, specify SPEED NUTS. Your Tinnerman representative can help you determine the right fastener for the job. Call him in soon. And write for your copy of "Savings Stories" Vol. 11, Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A.—7 rue Henri Barbusse, Levallois (Seine) France.


Upper plexiglas panel is attached to frame in HTK-1 Helicopter by means of Flat-Type SPEED NUTS and machine screws. Detail of vibration-proof assembly is shown below.
TINNERMAN
Speed Nuts

"EAGER BEAVER" Army's newest six-by-six. Built by Reo Motors Inc., Lansing, Michigan. Lives up to its name by hauling a full pay load up 60° grades . . . traversing rivers and streams with its engine fully submerged. The South Wind "978" introduces fresh air to keep windshields completely frost-free, cab and personnel comfortably warm.

NEWEST MILITARY VEHICLES CONQUER SUB-ZERO COLD

Reveal Details of Revolutionary New Heating Development for Army

Now ready to roll. Specially equipped to keep rolling under the severest weather conditions! These new Army vehicles boast increased personnel comfort, greater efficiency in sub-zero cold—all the results of an amazing new military heater: the South Wind "978."

Simplified in design. Compact. This rugged forced air heater preheats, heats, and defrosts in any type of military vehicle—in temperatures as low as 70° below zero. Dependably safe because the combustion air system is completely separated from the ventilating air stream. Always fast acting because warm air circulation doesn't depend on engine heat.

Built to Army Ordnance specifications, the "978" has been standardized by the Army for its winterization program. And because of its many exclusive advantages, promises to be influential in fashioning future designs for commercial car heating, too.

ACT NOW: Find out how this revolutionary new "978" military heater can effectively answer *your* vehicle heating and engine pre-heating requirements. Get the experienced counsel of a trained field engineer. Wire, write or phone Stewart-Warner Corporation, South Wind Division, Dept. E-42, 1514 Drover Street, Indianapolis 7, Indiana. Do it today.

STEWART-WARNER

PERSONNEL HEATING *South Wind*
ENGINE AND EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

12 WHEELED eight ton heavy duty cargo carrier. South Wind "winterized." A "978" heater keeps frost off the windshields . . . freezing cold outside the cab.

SELF-PROPELLED artillery. New M 41 Motor Carriage with 155 mm. Howitzer. Equipped with two South Wind "978's" for personnel heating, and for heating gun components.

FOR GOOD VISION IN BAD WEATHER!

DIRECT ELECTRIC DRIVE, SYNCHRONIZED, TWO SPEED OPERATION OF DUAL ARMS. TANDEM OR OPPOSED WIPING MOTION. AUTOMATIC BLADE PARKING. THERMAL CUTOUT PROTECTS WIPER MOTOR AGAINST OVERLOAD.

TWIN ARCS OF SAFETY VISION FOR CARS, TRUCKS, TRACTORS. ARMS UP TO 12" LONG. BLADES UP TO 14". 30 INCH/LBS. TORQUE PER BLADE. WIPING ANGLE UP TO 118°. FOR 6 OR 12 VOLT SYSTEMS.

AMERICAN BOSCH
DUAL ELECTRIC WINDSHIELD WIPER

Independent of engine vacuum and regardless of speed, load, or acceleration on up-grades, this powerful, direct electric drive Dual Wiper *always* functions at constant, synchronized speed. No stalling, no stuttering of the wiper blades to cloud good, safe vision of the road ahead, even in the roughest weather.

Ask about Dual Model WWB — designed for swift, simplified installation under cowl on cars and trucks. Rugged, heavy-duty American Bosch construction guarantees years of trouble-free service. Already in wide use as original equipment, these Dual Electric Wipers are today's positive answer to good vision in bad weather and they offer a keen, sales active feature for your vehicles. Ask for complete specifications. American Bosch Corporation, Springfield 7, Mass.

Also Available—the famous WWA Single Electric Wiper for Truck, Bus and Marine service.

AMERICAN BOSCH

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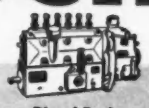
Components for Aircraft Engines

All Electric Windshield Wipers

Ignition Coils


Diesel Fuel Injection Equipment

Now!

TOCCO* Induction Melting Furnaces for Precision Casting

One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

●Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

★Stepless power control
★Extremely Rapid Melting
★High Efficiency on Intermittent Operation
★Good Mixing because of Natural Agitation
★Extremely Low Alloy Loss
★No Carbon Pick-up
★No Contamination when Composition of Charges is Changed
★High Reproducibility of Results
★Minimum Space Requirements
★No Special Installation Charge
★Simple, Safe Operation
★Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

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Mail Coupon Today

NEW **FREE** BULLETIN

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Please send copy of "The Case for TOCCO Induction Melting."

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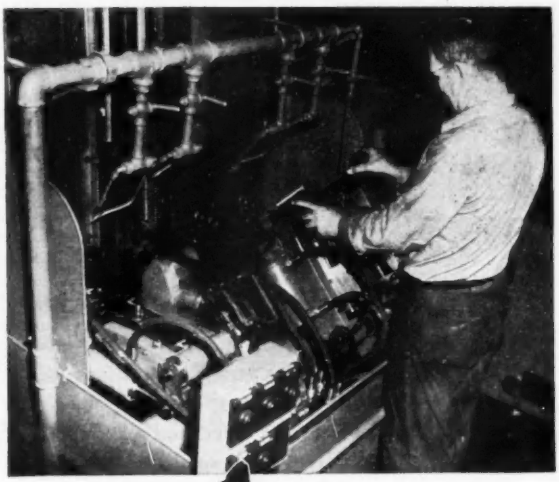
Here's

- BALANCED PRODUCTION
- SIMPLE LOADING
- AUTOMATIC CLAMPING

the *American* WAY

SIMPLE LOADING plus AUTOMATIC CLAMPING gives the manufacturer of these connecting rods and caps BALANCED PRODUCTION at the rate of 300 complete assemblies per hour.

The installation, engineered the American-way, consists of a Standard American 10-ton, 42-inch stroke vertical duplex hydraulic broaching machine and two, two-station fixtures mounted on completely automatic tilting-type work tables. Fixtures are interchangeable. One station on each fixture holds a rod part, the other a cap. The operator simply PLACES a rod and a cap on the first fixture . . . then pushes the control buttons. The parts are CLAMPED AUTOMATICALLY while the table tilts down and then broached. While one assembly is broached the operator loads the other fixture.



AMERICAN CAN HELP YOU SOLVE YOUR PRODUCTION PROBLEMS

Just as American has helped thousands of other manufacturers during the past twenty-five years, they can help YOU solve your production problems. For the answer to your problems send a part-print or sample and hourly requirements. Address Dept. I.

WRITE TODAY *for your copy of American's Circular No. 300 on American Vertical Hydraulic Surface Broaching Machines.*

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See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Tires that move the earth

Schrader—top tire valve manufacturer—actually produced the first working samples of large bore tire valves in cooperation with the tire industry. What started as an experimental development is now a complete, practical line of Schrader Products to help the industry move the earth.

A. SCHRADER'S SON, BROOKLYN 17, N. Y.
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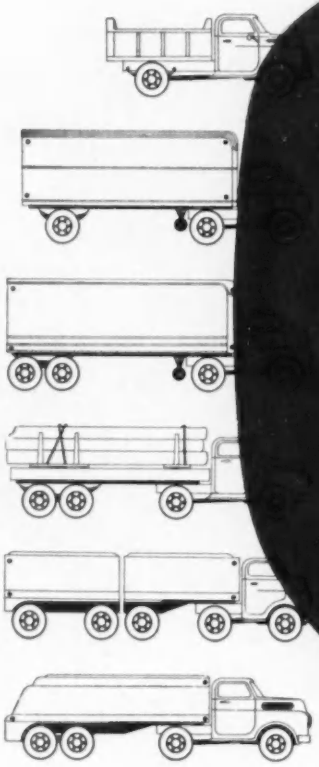
Giant earthmovers have changed the face of our country . . . building roads, laying foundations, even the mining of open-strip ore veins. These machines of progress are made possible and practical by the ingenuity of America's tire manufacturers. Vital to proper performance of these giant tires is the valve that *locks* the air in the tire.

Schrader
REG. U. S. PAT. OFF.

FIRST NAME IN TIRE VALVES
FOR ORIGINAL EQUIPMENT AND REPLACEMENT

GUNITE WHEELS MAKE GOOD TRUCKS BETTER



GUNITE **...ELS**

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and Trailer Manufacturers

Many engineers are specifying Gunite Cast-Steel Wheel Assemblies on their heavier trucks and trailers. They gain all these advantages:

1. Minimum weight with maximum strength
2. Better appearance
3. Floating rim bolt for easy replacement
4. Increased safety of famous Gunite Brake Drum
5. Greater air-cooling over brake drums
6. Easier Assembly . . . less weight to handle

Write for Complete Engineering Data

ESTABLISHED IN 1924

ROCKFORD ILLINOIS

GUNITE FOUNDRIES CORPORATION

Steel veins for iron horses

Steel veins for iron horses—strong, durable veins easily forged and fabricated to exact requirements—this is but one of the many applications for OSTUCO Tubing in products of modern design, products that strengthen America and the free world.

OSTUCO Tubing presents endless opportunities for improving design in almost every field. In addition to infinite adaptability, OSTUCO Tubing offers such advantages as maximum strength with minimum weight, good surface conditions for finishing, excellent machinability, and low cost. We cannot always promise early delivery estimates on new civilian orders, because of military demands, but it will pay you to consult our experienced engineers about OSTUCO Tubing when redesigning your products to meet future competition.

From Your Blueprint . . . to Your Product
OSTUCO TUBING
Tapering • Swaging • Flanging • Bending
• Upsetting • Expanding • Reducing • Beading
End closing • Spinning • Drilling • Slotting
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The Crankshaft

—probably the most important single part in the modern high-speed, high-compression, internal-combustion engine.

Wyman-Gordon—specialists in the design and forging of crankshafts since the start of the automotive industry—furnished the first heat-treated crankshaft, forged the first six-throw crankshaft, forged the first eight-throw crankshaft, forged the first crankshaft with integral counterweights. In automotive crankshafts and in all types of aircraft forgings, steel and light alloy, there is no substitute for Wyman-Gordon experience.

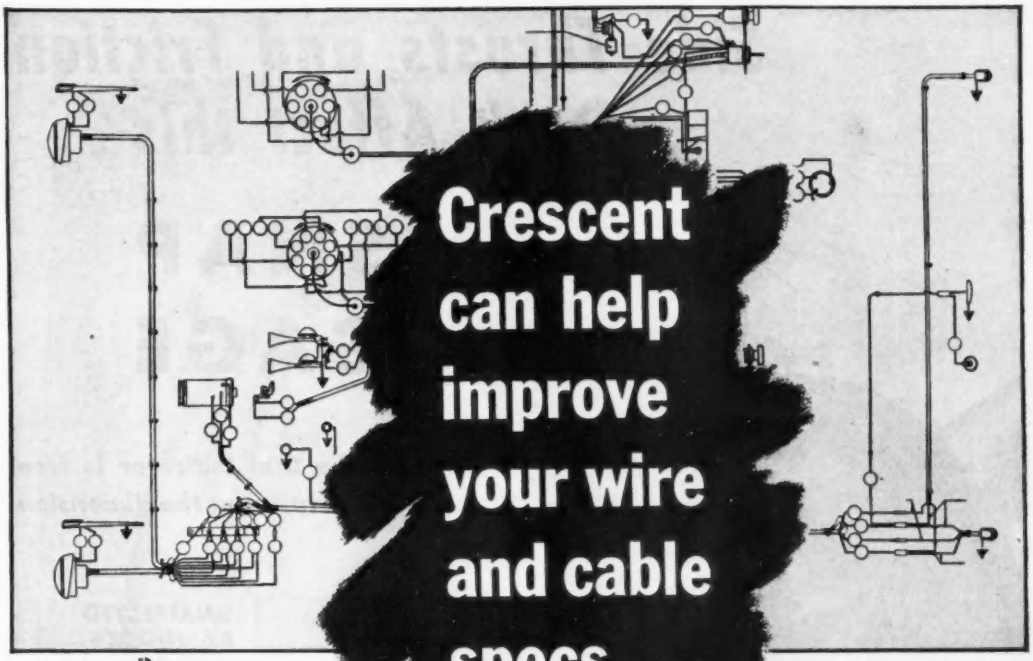
Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

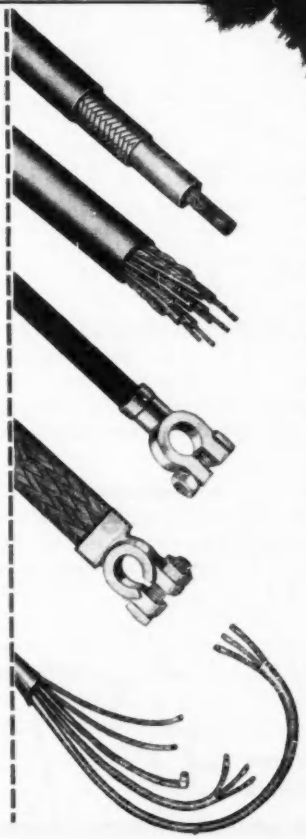
FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN



Crescent can help improve your wire and cable specs...



Through engineering cooperation with manufacturers of automobiles, buses, trucks, trailers, aircraft, tractors, industrial and farm power-equipment, Crescent has made important contributions to the improvement of wire and cable specifications. These improved specs mean worthwhile savings in assembly costs as well as increased efficiency in starting, lighting, and ignition systems.

Crescent engineering and manufacturing facilities are complete. Wire is drawn to size from copper bars. Insulating compounds designed in our laboratories to meet the most exacting requirements are formulated from natural rubber, synthetic rubber, and the latest plastics. Constant laboratory testing maintains uncompromising quality control right from the start.

We invite you to discuss the advantages of integrating your engineering with ours. No obligation, of course.

THE CRESCENT COMPANY, INC., PAWTUCKET, RHODE ISLAND

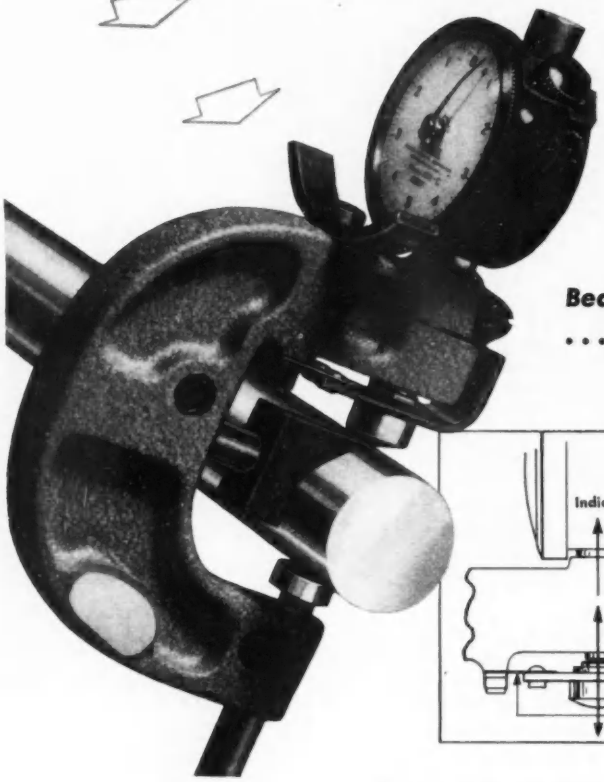
CRESCENT

Wiry Joe

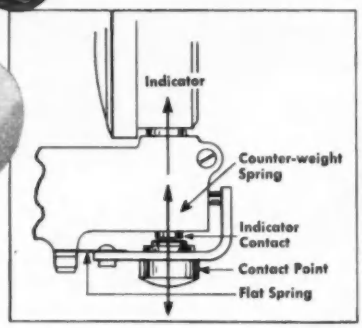
AUTOMOTIVE WIRE AND CABLE

Side Thrusts and Friction Don't Affect this

SNAP GAGE

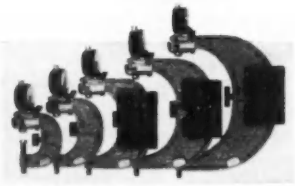


Because the Dial Indicator is free . . . while measuring the dimension



UNAFFECTED BY SHOCKS AND FRICTION

The flat spring supporting the contact point takes all the shocks and side thrusts — the indicator contact point merely rides on the gage contact point. There is no tendency for the indicator spindle to bind. Counterweight spring offsets weight of gage and of inspector's hand.



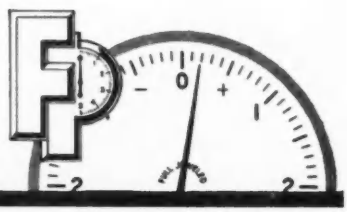
Model 1000 P-1 (0" to 1")
Model 1000 P-2 (¾" to 2")
Model 1000 P-3 (1¾" to 3¼")
Model 1000 P-4 (3" to 4½")
Model 1000 P-5 (4" to 6")
Price, any one gage with .0005" grads. $57.50
Price, any one gage with .0001" grads. $75.00
Larger sizes special

FEDERAL MODEL 1000 SERIES GAGES *show you the amount of error* so you can make corrective adjustments *before you begin to produce scrap.* Measurements are not influenced by "feel" and any operator obtains the same reading. These gages are fast, lightweight, and more accurate than conventional "go, no-go" gages.

Five gages enable you to inspect *all* dimensions from 0" to 6". There are no extra gage costs when size requirements change — Adjustments can be made easily with a screw driver! Write for folder on these modern gages. Federal Products Corporation, 1264 Eddy Street, Providence 1, R. I.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES



do you know what this is?

SEND for 24-Page Free Booklet on Harter's Production Facilities available for sub-contracting.

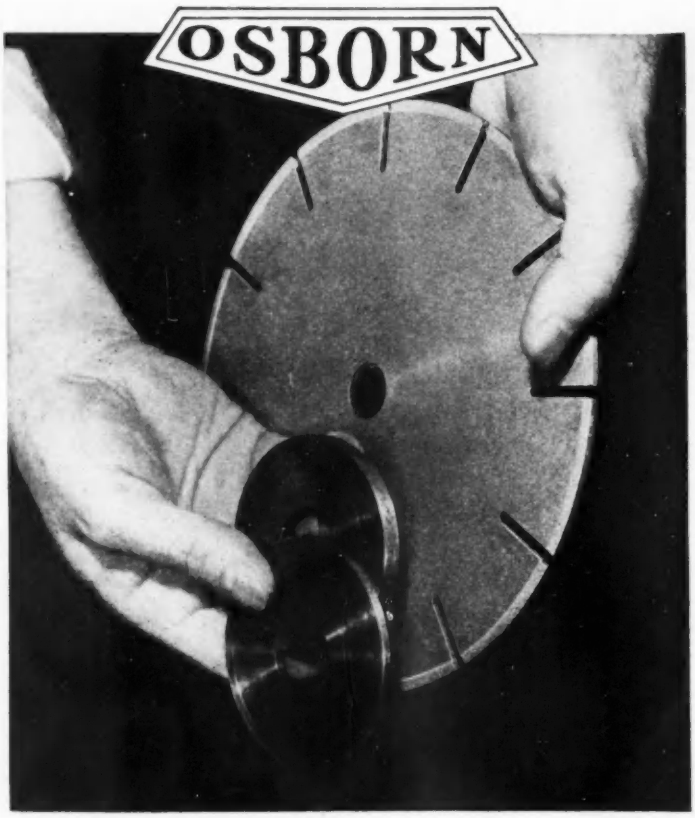
You're right if you tagged it as a frame for a midget racer. And, chances are, you know metal fabrication and talk the same language as the men of Harter who made this little car as a hobby. Perhaps the most interesting fact about this car is that in a few days it progressed from a mere doodle on a designer's pad to actual production. This is typical of the ability of the Harter organization to translate quickly an idea into a finished product. This quality makes Harter a splendid subcontractor when you need help *fast* to make promised delivery on defense contracts.

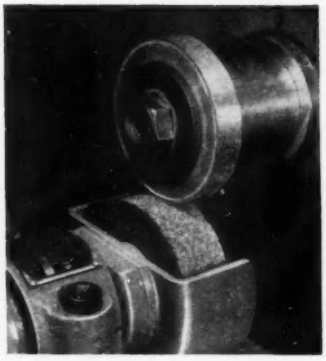
HARTER

STEEL POSTURE CHAIRS

STURGIS, MICHIGAN

Write **Harter Corporation or phone Sturgis 781 for complete information on Harter's metal forming and fabrication facilities. Harter Corporation, 435 Prairie Avenue, Sturgis, Michigan.**





TRUE THE SURFACE. With this set-up true two diamond wheels at a time. Surfaces become uniform and perfectly flat. Usually takes about 15 to 30 minutes.

BRUSH THE MATRIX. Rotate the two wheels counter to rotation of Osborn wire wheel brush. This dressing removes some of the brass matrix. Leaves the diamonds exposed.

SEE THE DIFFERENCE. Two wheels on left show grooves before truing. Surface is arched. Two wheels on right have been trued and dressed. Dressing increased cutting action 80%.

Diamond-saving idea makes them do 80% more work!

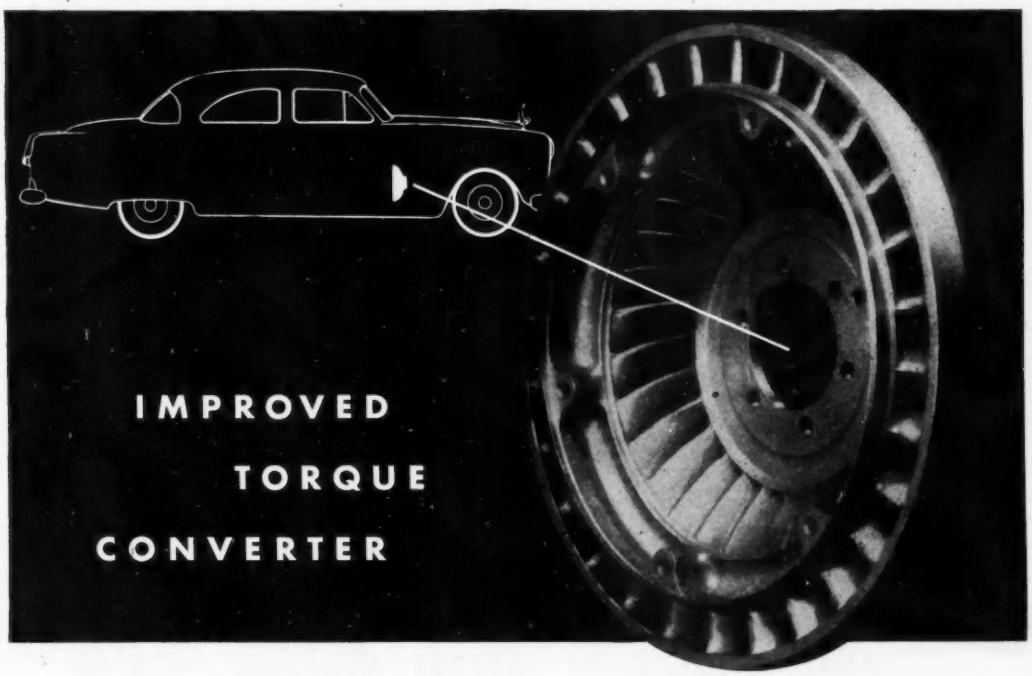
Longer life and faster production from critically scarce industrial diamonds are being obtained by this method of dressing diamond wheels:

When wheels become grooved and out of square, true them by grinding, two at a time. After truing, mount wheels together in grinder and dress with counter-rotating 8-inch Osborn wire brush. This brushing removes some brass matrix, exposing the diamonds. One plant reports that this increases the wheel's cutting action 80%.

This is typical of many production aids available through your **O**sborn **B**rushing **A**nalyst. Call him today or write *The Osborn Manufacturing Company, Dept. 687, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



Alcoa Research and Development helps automobile manufacturer develop improved impeller design

The manufacturer's engineers knew torque converters. They knew improved performance was obtainable only with stronger, lighter, more intricate impellers. Standard fabrication methods involved wasteful machining of cast or forged blanks, costly assembly of stamped parts.

They asked their Alcoa sales engineer: "Can we do it in aluminum?" He analyzed the economic and performance factors of the application, passed the problem on to Alcoa's Research and Development Divisions.

Research suggested plaster casting because design changes could be made readily and inexpensively. It promised smoother, more intricate castings requiring less machining. Design refinements were made and Alcoa cast the first samples. They came from the molds smooth and clean—perfect in detail.

Machined to final dimensions and stress-coated, they were tested in Alcoa's whirl pit at 10,000 rpm, over twice their normal operating speed. Alcoa engineers plotted the cracks in the brittle lacquer revealing strain concentrations, suggested design modifications.

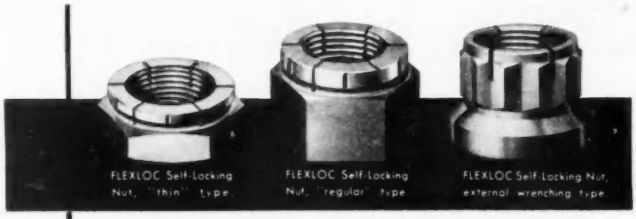
New samples were cast, tests repeated, designs refined. The final results of this twelve-month project: smooth, accurate castings exceeding every strength requirement; a better impeller without expected cost increases; a better torque converter.

Alcoa's Research and Development Divisions are ready to help you use the advantages of aluminum in your automotive applications. Facilities include a staff of automotive industries' specialists, complete research and development laboratories, process development shops. Call your Alcoa sales engineer or write direct:

ALUMINUM COMPANY OF AMERICA
1841-D Gulf Building • Pittsburgh 19, Pennsylvania

ALCOA

DEVELOPMENT DIVISION


FLEXLOC Self-Locking Nut, "thin" type
FLEXLOC Self-Locking Nut, "regular" type
FLEXLOC Self-Locking Nut, external wrenching type

IMPACT WON'T WORK THEM LOOSE

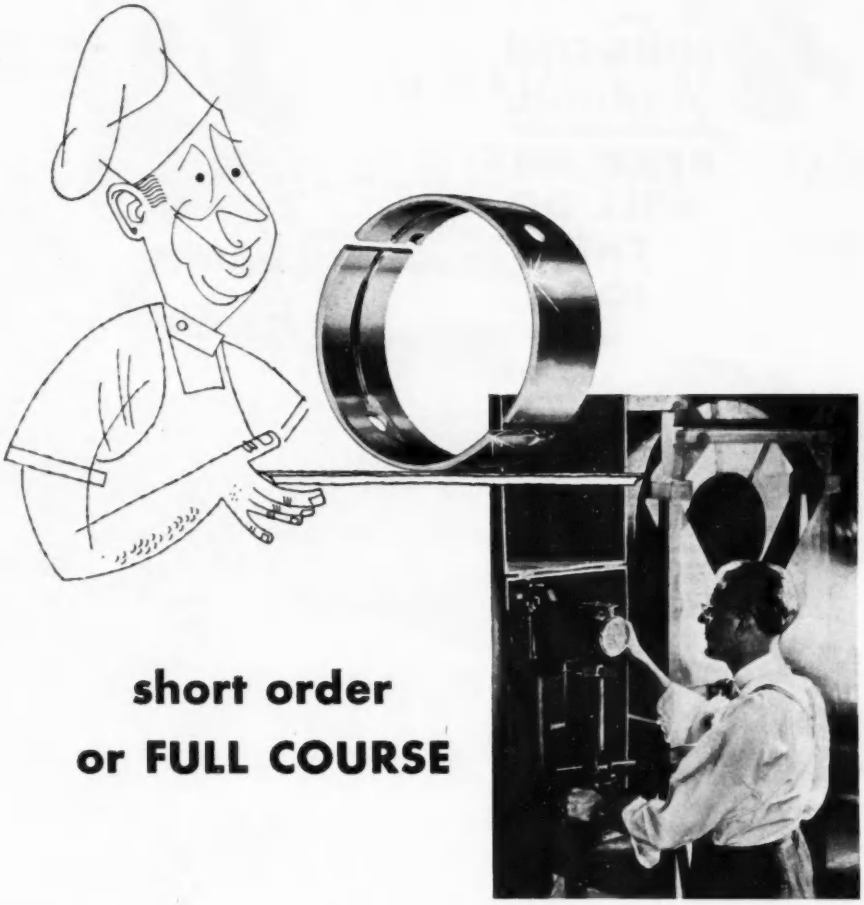
FLEXLOC Self-Locking Nuts are widely used on shuttles and other high speed, vibrating equipment where positive locking fasteners—the kind that stay tight even under severe service—are essential to operation of the equipment and safety of the personnel.

FLEXLOC Locknuts also offer one-piece, all-metal construction—nothing to work loose or drop off; no serious temperature problems—up to 550°F. does not affect them; resilient, automatic locking sections—processed to assure unusually uniform torques.

FLEXLOC Locknuts will solve many fastener-loosening problems. We'll be glad to supply FLEXLOC samples for tests on your equipment. Let us know the sizes needed. STANDARD PRESSED STEEL Co., Jenkintown 53, Pennsylvania.

FLEXLOC® LOCKNUT DIVISION

SPS
JENKINTOWN PENNSYLVANIA



short order or FULL COURSE

We can meet your most exacting requirements for custom quality engine bearings in small runs or mass-production quantities.

Our exacting production techniques have been developed over the years to cope with today's fluctuating demands for automotive, tractor and industrial engines.

When you specify our engine bearings you gain the "know-how" of more than 25 years of precision experience in the manufacture of the finest engine bearings.

DETROIT ALUMINUM & BRASS CORPORATION

DETROIT 11, MICHIGAN

If JOHNSON Ledaloyl BEARINGS WILL DO THE JOB

SELF LUBRICATING

WHY SPEND MORE?

They are extremely low in cost because Ledaloyl bearings and parts are produced by powder metallurgy, molded to shape, and require no machining. Of course, they are suitable in only certain applications. But in these particular uses Ledaloyl bearings give the utmost in service. Many engineers have investigated—some have found uses and are now making substantial cost savings. Johnson engineers will be glad to help you determine whether you can use Ledaloyl bearings to your advantage. Write, wire or call now.

JOHNSON BRONZE CO., 625 So. Mill St., New Castle, Pa.

SLEEVE BEARING HEADQUARTERS SINCE 1901

JOHNSON B BEARINGS
Sleeve-Type

Cylinder bore wear REDUCED . . 84.6%

Main bearing wear REDUCED . . 77.9%

Rod bearing wear REDUCED . . . 93.3%

Piston wear REDUCED 78.4%

with

PUROLATOR

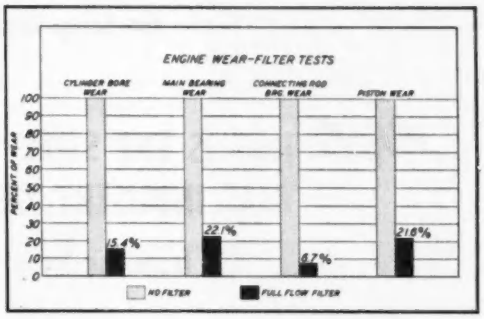
FULL-FLOW

MICRONIC FILTERS

THESE ARE THE RESULTS of tests just completed by one of the world's largest automobile and engine manufacturers.

The purpose of these tests was to determine how much the Micronic Full-Flow element reduces wear.

Running standard gasoline engines under extremely adverse conditions, test engineers found that Purolator Micronic* Full-Flow filtration was the best of all tried . . . far superior to any partial-flow filter.



The secret of this amazing performance is the Purolator* *Micronic* Filter Element with *ten times* the filtering area of old-style filters. It is the *only* element capable of delivering full-flow rates during its entire service life, with effective, dependable filtration down to *microns* (0.000039 in.)!

Purolator's Engineering Department will gladly cooperate in helping you adapt super-efficient Purolator Micronic Full-Flow filtration to your own requirements. *Just write!*

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices:
Chicago, Detroit, Los Angeles

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

HOW THE *SCRAP* THAT JACK MADE —MADE JACK *AND MORE*

This is the Scrap that Jack made.

This is the Man who found the Scrap that Jack made.

This is the Clerk who was called by the Man who found the Scrap that Jack made.

This is the Dealer who dealt with the Clerk who was called by the Man who found the Scrap that Jack made.

AND TO MAKE THE STORY SHORTER:

This is the jack the dealer paid for the Scrap that Jack made.

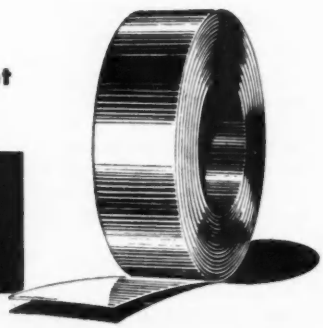
AND THIS IS THE STEEL THAT INDUSTRY GETS

from the Scrap that Jack made!

MORAL:

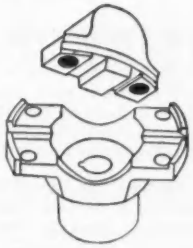
Check your Plant for Scrap Today and Get it Moving—*That* Pays Everybody!

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA



if VIBRATION is your problem

EVERY high Speed MECHANICS Roller Bearing UNIVERSAL JOINT and PROPELLER SHAFT is carefully B-A-L-A-N-C-E-D to reduce runout, whip and vibration to a minimum. Brake flanges are statically balanced or accurately machined all over. Complete shafts are dynamically balanced, *at high speed,* and factory tested to insure smooth operation. The scientific design of MECHANICS Roller Bearing UNIVERSAL JOINTS eliminates all useless, unbalanced weight. The original alignment and balance are not disturbed when replacing MECHANICS cross-and-bearing assemblies, because the bearings and pilots are accurately ground to insure absolute centering and perfect fit.



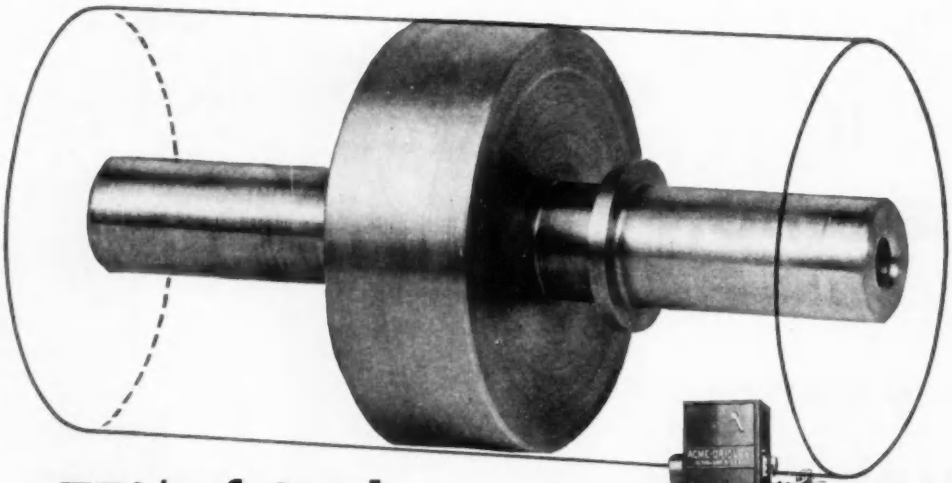
MECHANICS
Roller Bearing
UNIVERSAL
JOINTS
For Cars, Trucks, Tractors, Farm Implements, Road Machinery, Industrial Equipment, Aircraft

Let our engineers show you how this exclusive MECHANICS Roller Bearing UNIVERSAL JOINTS advantages will help improve the operation of your product.

MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner

2024 Harrison Ave., Rockford, Ill.

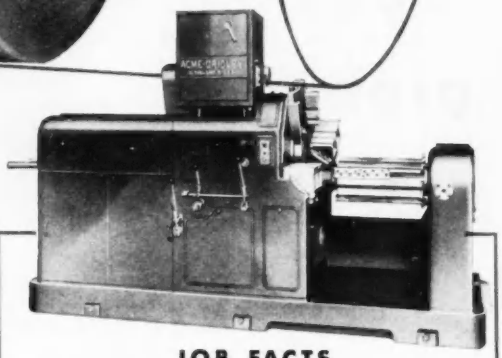


77% of Stock Hogged Off...

by heavy forming and turning on the new

ACME-GRIDLEY MODEL M

Single Spindle Bar Automatic



Almost 28 pounds of metal removed in fifteen minutes — that's the kind of punishment this Model M takes in stride. And it almost doubles the production of the turret lathe on which the job was formerly done.

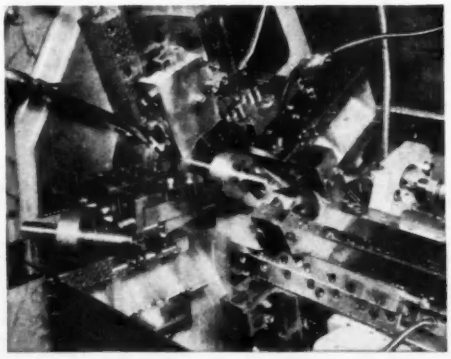
Here's customer-demonstrated proof that rugged construction plus ingenuity in design pay off in more production and lower machining costs. Check these exclusive design features:

- **Three automatic spindle speed ranges provide the correct surface speeds for different diameters of work and for top efficiency of carbide and high speed tools in the same set-up.**
- **Independent operation of 8 toolslides provides selection of proper feeds for each cut, while turret indexing without interrupting side cuts permits overlapping operations to gain production time.**
- **Easily accessible camming cuts changeover time; wide, open tooling zone speeds adjustments and chip removal.**

May we furnish quotations showing how the Model M can cut your machining costs? Catalog M-50-A

JOB FACTS

PART — Spur Gear
SIZE — 4¼" x 9"
MATERIAL — 4140 C.D.S. Annealed Bar Stock
MACHINE — Acme-Gridley 5½" Model M Single Spindle Automatic
BAR OPERATIONS — 14
TOOLS — Carbide and High Speed Steel
STOCK REMOVED — 98.222 cu. in.
MACHINE TIME — 15 min.
FORMER TIME — 29 min. (Turret Lathe)



The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

County by County . . . City by City

STOP GUESSING AT SALES QUOTAS

POLK MARKET VALUATION INDEX

Guessing may be easy—but KNOWING is more profitable. The automotive field is one of the few in which basic facts regarding each local market are known. You can plan for future sales from a sound basis.

Polk total car and truck registrations are now available to you on new sales control sheets that enable direct comparison with your own sales records. In any selling program involving automobiles, the *basic fact* you need is the number of cars and trucks in each sales area.

Here is a new idea that makes it easier and more economical to make fuller use of automotive registration statistics.

Polk's new registration counts give you:

—total number of cars in operation as of December 31, 1951

—for each urban post office town: arranged by county and by state

—printed on 8½ x 11" work sheets with column headings under which you can post from your own records such related items as advertising expenditures, sales expenses, sales quotas, number of sales outlets—right alongside the *basic facts* about the size of the market.

Learn the complete story of this new Polk service. Let us tell you how it can fit your program.

★ ★ ★ ★ ★ ***Serving the Automotive Industry and its Dealers Since 1923*** ★ ★ ★ ★ ★

R. L. POLK & CO. MOTOR STATISTICAL DIVISION
431 Howard Street • Detroit 31, Michigan

BRANCHES: New York • Philadelphia • Cleveland • Chicago • St. Louis • Cincinnati

ALSO Planned Direct Mail Promotions...Consumer Research...City Directories...Automotive Statistics...Polk Bankers' Encyclopedia...Mailing Lists...Contest Management

IS YOUR SCRAP and SALVAGE PROGRAM MISSING THE BIG STUFF?

The Steel Industry urgently needs Scrap that you may have!

The "big stuff" we're talking about is *dormant* scrap . . . the heavy equipment, machinery, tools, dies, etc. that have become obsolete, or inefficient, or just plain wornout and useless.

Dormant scrap isn't so easy to get moving because it usually requires someone in authority to say "That's no good to us any more. Let's get it out of here!" But there are an estimated several million tons of it available *now*, and thousands of steel mill representatives are calling on manufacturing plants nationwide to help dislodge it.

Because, we *need* it! The Steel Industry faces a serious current shortage of scrap, not to mention a continuing demand for at least 50% more scrap than in the peak year of World War II. ● Check whether *you* have any dormant scrap and sell it now!

Contributed in the National Interest by

ALLEGHENY LUDLUM STEEL CORPORATION

Henry W. Oliver Building • Pittsburgh 22, Penna.

FREE BOOKLET

ON ALCOA'S NEW, ALL-PURPOSE COILED TUBE

This new booklet gives complete facts about UTILITUBE—Alcoa's new, all-purpose coiled tube. Alcoa UTILITUBE is designed to handle fuel and lubricants in engines, air in instrument systems, fluids in hydraulic systems, cutting compounds in machine tools, etc.

It will save you up to 40% on tube costs. It gives you 3 times more feet per pound. It forms, flares and bends more easily than annealed copper. It will not gum, sludge or discolor the fluids it carries. Write:

ALUMINUM COMPANY OF AMERICA
835D Gulf Bldg. • Pittsburgh 19, Pennsylvania

ALCOA

MARKEM®

marks them all

FROM ARTILLERY SHELLS TO MEDICAL AMPULES

MASTERS OF MARKING — Since 1911

Markem methods, machines, type and inks have been marking the products of industry for forty years. Markem machines can mark up to many thousands of pieces per hour. They make clear, durable imprints on flat, curved or irregular surfaces of paint, paper, wood, glass, metal, leather, plastic, rubber, fabric, composition and pressure sensitive tapes. No special skill is needed for their operation. Legend and color of imprint may be quickly and easily changed.

MAKE YOUR MARK WITH MARKEM

When your products need marking for Identification, Control or Market — ask Markem. Submit your problem, together with a sample of the item to be marked. Markem Machine Company, Keene 8, New Hampshire.

MARKEM
BETTER MARKING SINCE 1911

How Can America Produce All the Steel It Needs ... for Military... and Civilian Purposes?

FREE BOOKLET Tells How to Conduct Scrap Salvage Program in *Your* Business.

Address Advertising Council, 25 W. 45th St., New York 19, N. Y.

One way is to feed more pig iron into the furnaces. But . . .

That will require *more* supplies of ore, limestone, coal, etc.*—to say nothing of more new ore boats and rail cars to transport the additional supplies.

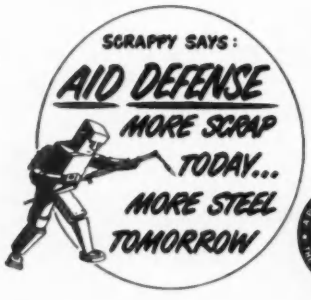
A better way—the *only* practical way—is to use the *dormant* iron and steel scrap lying around in the form of old machines, equipment, tools and metal structures.

Your business *must* have available scrap—in *some* form. That scrap is *needed* to keep the furnaces going in the steel mills . . . to keep our fighting forces and our allies well armed . . . to sustain our civilian life at home.

Think how many ways *you* use iron and steel. Think what would happen if it became extremely scarce. Put your iron and steel scrap to good use—now—by selling it to your local scrap dealer.

Don't delay—the emergency is becoming more severe every day.

*For every ton of scrap fed into the furnaces, we save approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other critical materials. Also, scrap helps make steel faster, shortens the refining process.



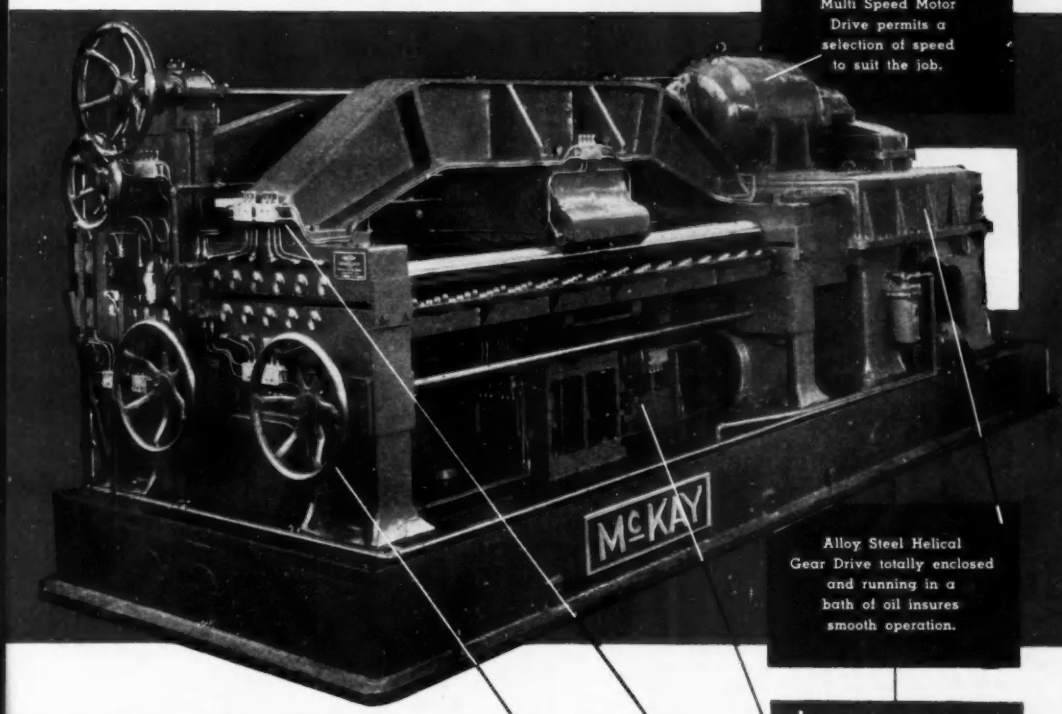
NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

Automotive Industries

why do McKay Machines

LAST LONGER ?



Multi Speed Motor Drive permits a selection of speed to suit the job.

Alloy Steel Helical Gear Drive totally enclosed and running in a bath of oil insures smooth operation.

One shot system provides correct lubrication for all moving parts.

The McKay Flex Roll Sheet Processor is universally accepted by the automotive and stamping industries for eliminating stretcher strain and reducing scrap loss due to breakage in die drawn parts. The Processor combines a deep flex rolling under tension and a thorough cold working of the steel sheet by roller leveling, to condition it for deep drawing operations.

McKAY

The **McKAY MACHINE** *Company*

YOUNGSTOWN, OHIO

HI-EFF BALANCING

- *Fast*
- *Accurate*

This 250-pound blower fan is being balanced to a 1 ounce inch on a HI-EFF Balancing Machine. The same Balancer is used for a wide variety of pieces up to 1200 pound size. It provides rapid balancing with accuracy indicated by the following tolerances:

Pieces weighing 500 to 1200 pounds, within 2 oz. inches.

Pieces weighing 75 to 500 pounds, within 1 oz. inch.

Pieces of lighter weights to diminishing tolerances down to .02 oz. inch.

HI-EFF Balancing machines are available in 5 sizes with work piece diameters up to 48 inches. These may be equipped with HI-EFF Hand Weighing Mechanism (as shown) or HI-MAX Direct Reading Mechanism. Write for folder "Balance Your Product."

TAYLOR DYNAMOMETER AND MACHINE COMPANY

528 A West Highland Avenue, Milwaukee 3, Wisconsin

Manufacturers of HI-EFF Hydraulic Dynamometers — Static Balancing Machines — Sensitive Drilling Machines.

"We Produce Springs, Wire Forms and Small Stampings in all Grades and Quantities

May we quote on your requirements?"

Producing Clutch Pressure Springs
. . . Clutch Dampener Plate Springs

The U. S. STEEL WIRE SPRING Co.

7800 FINNEY AVE. • MICHIGAN 1-6315

CLEVELAND 5, OHIO

THE BASIC SHAPE IS ALREADY MADE WHEN YOU USE

Shelby Seamless

● You can do practically anything with a tube that you can do with a solid round bar—and you save the cost of the hole.

Thousands of machine shops take advantage of this fact and produce high quality machined parts at savings up to 50% with the aid of Shelby Seamless Mechanical Tubing.

Boring and extensive machining can be minimized—sometimes eliminated—with Shelby Seamless. You save time, labor, materials, as well as wear and tear on expensive tools. You can often select just the right tube for your job, because Shelby Seamless is made in so many sizes, wall thicknesses, steel grades and finishes. Some shops find they can simply cut the tube to length, and with a clean-up finishing operation, the job is through.

When you get into *volume* production, it's reassuring to know that with Shelby Seamless, uniformity can be taken for granted, due to our tightly controlled manufacturing process. Whether you make one part, or hundreds or tens of thousands, this dependable uniformity makes it possible to closely estimate your time, labor and material.

Our engineers will be glad to help you utilize the many advantages of Shelby Seamless for your product. Meantime, send for our free Bulletin Number 17. It may help you cut time and costs—and make a better product in the bargain.

All National Seamless Tubes are pierced from a billet of high quality steel. This is the one manufacturing method that assures absolutely uniform wall strength.

NATIONAL TUBE DIVISION, UNITED STATES STEEL COMPANY, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

U·S·S SHELBY SEAMLESS MECHANICAL TUBING

UNITED STATES STEEL

CITCO

SOLID COPPER

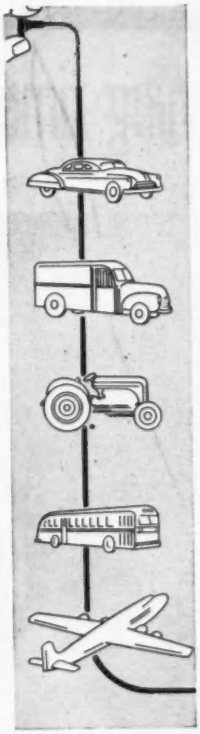
Diamond

TOOLS

Citco Solid Copper diamond tools give you higher performance; reduce production costs and increase tool life.

Inquiries on production, set-up and tool design, will be answered without obligation.

CLEVELAND INDUSTRIAL TOOL CO.
1080 East 222nd St. Cleveland 17, Ohio



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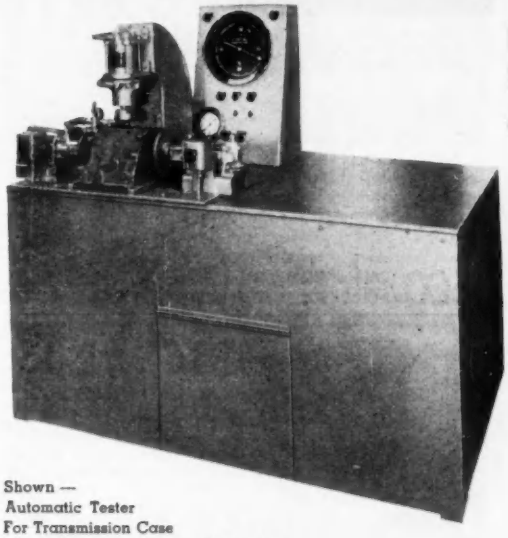

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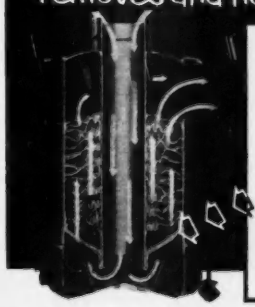

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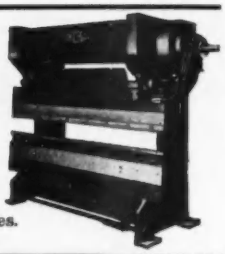

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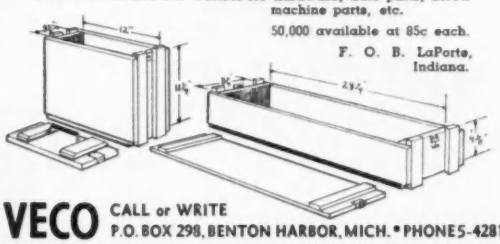

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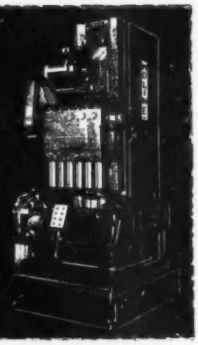

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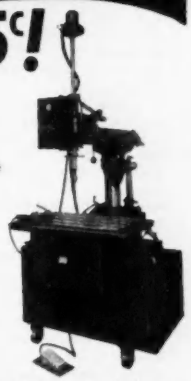

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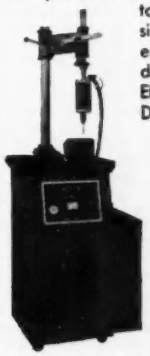

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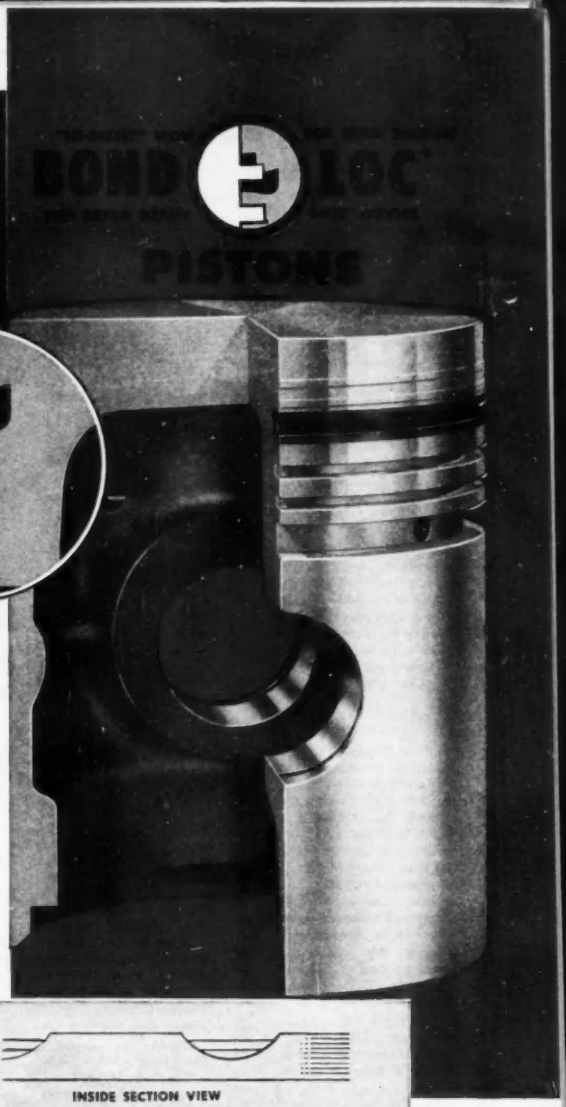

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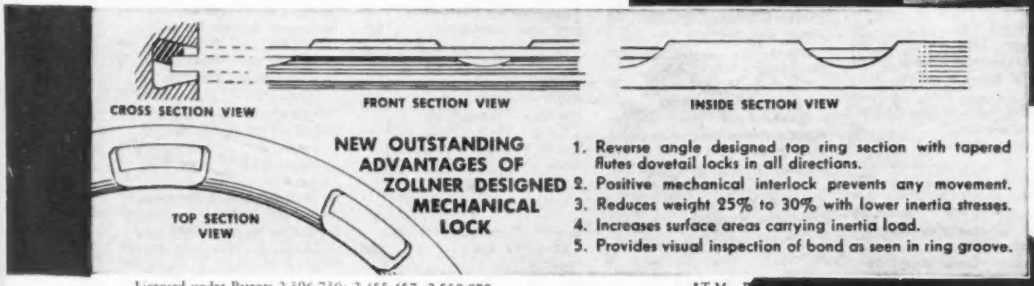
MECHANICALLY Zollner Lock

Now, another great advancement in piston design is made available to engine builders by Zollner engineers. It's the new BONDOLOC Piston for heavy duty engines where excessive top ring groove wear has been a problem. A "Ni-resist" iron groove section is *permanently* incorporated in this piston by *both* Al-fin metallurgical and Zollner mechanical bond — *double bonded and locked* to positively prevent separation failure in any service. The exclusive Zollner mechanical lock with reverse angles on every surface joining "Ni-resist" iron and aluminum provides a multiple dovetail bond which is infinitely wedge-locked. Zollner engineers invite immediate discussion of the many advantages of BONDOLOC Pistons by application to your engine.



NEW OUTSTANDING ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes dovetail locks in all directions.
2. Positive mechanical interlock prevents any movement.
3. Reduces weight 25% to 30% with lower inertia stresses.
4. Increases surface areas carrying inertia load.
5. Provides visual inspection of bond as seen in ring groove.

Licensed under Patents 2,396,730; 2,455,457; 2,550,879. *T.M

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- ADVANCED ENGINEERING
- PRECISION PRODUCTION in Cooperation With Engine Builders

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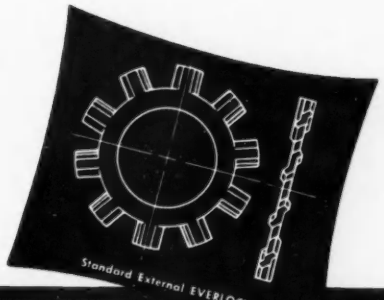
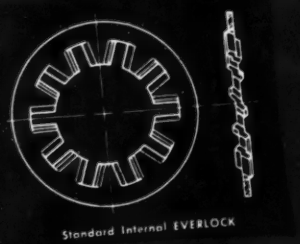
Everlock

"CHISEL EDGE" LOCK WASHER

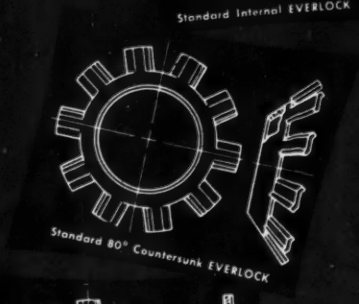
QUALITY



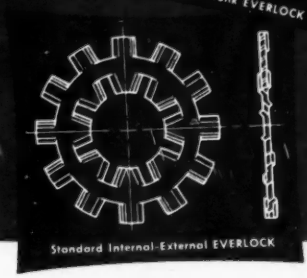
QUALITY



FOR YEARS,



BUT



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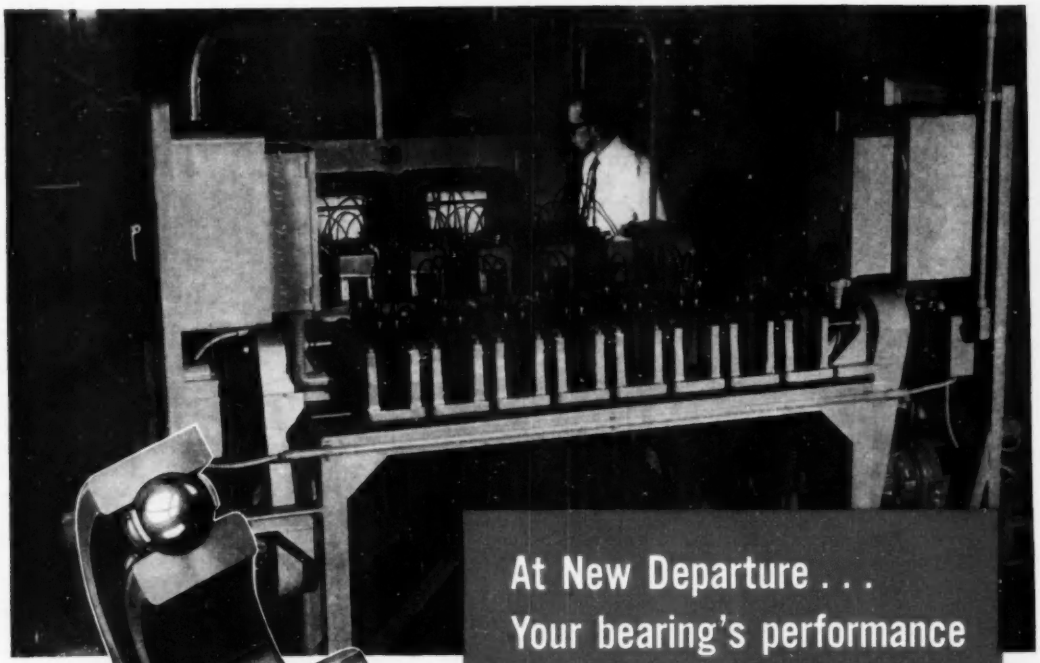

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